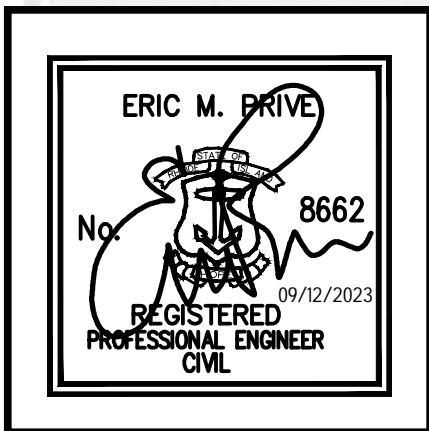




Stormwater Management Report



Fieldstone Farms

Located in South Kingstown, RI

Applicant: Old North Land Investments, LLC

4-08-2022

Revised: 8-28-2023

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Executive Summary

On behalf of Old North Land Investments, LLC, we are submitting drainage calculations for the proposed development located at the intersection of Old North Road and Stony Fort Road in South Kingstown, RI. The site is located on Assessors' Plat 16-4 Lot 9. The site has a total area of 118.60 acres, contains a 56.7 acres of wetland area and is covered by woods. Old North Land Investments, LLC is proposing the construction of 39 residential lots to be serviced by public water and private OWTS. The residential development includes sixteen (16) residential homes with frontage on Old North Road and Stony Fort Road. The remaining twenty three (23) lots will have access off of a new proposed roadway that will intersect with Stony Fort Road.

The development site is located within the Saugatucket Watershed and has a very large wetland complex that discharges to a stream system that ultimately discharges into the Saugatucket Pond which is located south of the development and south of Saugatucket Road. Post development storm water from the site will be treated for water quality using Best Management Practices (BMPs). The site has been designed to meet the Rhode Island Storm Water Design and Installation Manual (RISDISM). The groundwater table through the site ranges from 18" -24" and careful consideration was taken when the site was designed. The sixteen (16) residential homes with frontage on Old North Road and Stony Fort Road are designed with bio-retention areas to treat storm water and promote infiltration. Bio-retention systems promote pollutant removal of phosphorus, nitrogen, pathogens, and other metal removal such as Cadmium, Copper, Lead, and Zinc. Storm water runoff from the proposed roadway will be directed through a closed drainage network to a drainage area that includes a sediment forebay, sand filter, and detention basin. Fifteen (15) of the sixteen (16) homes with frontage along Old North Road and Stony Fort Road are proposed with private OWTS bottomless sand filter systems. The remaining twenty three (23) homes will be connected through a low pressure sewer service to a community OWTS system. All of the proposed OWTS systems are located greater than 150 feet from any wetland edge and they are also all proposed as denitrifying systems as required by RIDEM.

This report details how the proposed development will show no net increase in stormwater runoff from pre development to post development conditions, provide water quality treatment for stormwater runoff, as well as providing provisions for erosion control on site.

Pre development Conditions versus Post Development Conditions for each watershed are summarized below:

Watershed #1: (DP-1)

Conditions	1-Year	10-Year	100-Year
Pre Dev Summation	43.48 cfs	143.75 cfs	346.56 cfs
Post Dev Summation	43.78 cfs	139.98 cfs	338.28 cfs
Net Change	+0.30 cfs	-3.77 cfs	-8.28 cfs

(cfs = cubic feet per second)

Watershed #2: (DL-2)

Conditions	1-Year	10-Year	100-Year
Pre Dev Summation	4.35 cfs	14.35 cfs	34.51 cfs
Post Dev Summation	2.74 cfs	9.51 cfs	23.33 cfs
Net Change	-1.61 cfs	-4.84 cfs	-11.18 cfs

(cfs = cubic feet per second)

There is a minor increase in storm water flows for the 1-yr storm event due to uncontrolled areas within each watershed. These areas include impervious roof and driveway areas directed towards QPAs and lawn areas that cannot be controlled. There is insignificant discharge from the detention basin during the 1-yr storm event, which meets all channel protection volume requirements, and the storm water flow increase is due to the change in ground cover type in uncontrolled areas.

1.0 Project Description

The purpose of this report is to specify a “Storm Water Management System” and a “Soil Erosion and Sediment Control Plan” to be implemented in the construction and maintenance of Fieldstone Farms Subdivision located at the intersection of Old North Road and Stony Fort Road in South Kingstown, Rhode Island.

The major subdivision is located on South Kingstown Assessors Plat 16-4 Lot 9. The owner and applicant of the residential development is Old North Land Investments, LLC. The site has a total area of 118.60 acres and contains a 56.7 acres of wetland area. The property is zoned residential R-40 and is surrounded by R-30 and Government and Institutional Zoning. The surrounding areas are serviced by wells, public water, private OWTS, and above ground utilities. The site is entirely wooded with a large wetland complex located through the central area of the site. The wetland edges were delineated by Natural Resource Services, Inc. and field located by DiPrete Engineering. The wetland edges were verified by RIDEM under application #06-0374. The site is located in FEMA flood zone X and this zone is where minimal flooding occurs. The site has a mixture soil types which are classified as B & D soils. All of the proposed development is located within the area of B Soils. These B soils include Scio soils and Narragansett soils which both are suitable for development.

The proposed development includes a total of thirty nine (39) residential lots and is designed as a flexible design residential project. Sixteen (16) residential homes are proposed with frontage on Old North Road and Stony Fort Road. The remaining twenty three (23) lots will have access off of a new proposed roadway that will intersect with Stony Fort Road. The storm water quality will be improved by utilizing Best Management Practices (BMPs) as established by the RISDISM for the treatment of storm water runoff from the proposed development. Storm water from the residential homes and driveways with frontage on Old North Road and Stony Fort Road are designed with bio-retention areas to treat storm water and promote infiltration. Storm water runoff from the proposed roadway will be directed through a closed drainage network to a drainage area that includes a sediment forebay, sand filter, and detention basin. The system has been designed to meet the RIDEM Stormwater Design and Installations Standards Manual November 2018.

2.0 Site Conditions

2.1 SOILS

The following are soil types identified within the analyzed area of the Site as mapped by the NRCS USDA Soil Conservation service:

Soil Symbol	Description	Hydrologic Group
NbB	Narragansett very stony silt loam, 0 to 8% slopes	B
Rf	Ridgebury, Whitman, and Leicester extremely stony fine sandy loams	D

ScA	Scio silt loam, 0 to 3 percent slopes	C
SdB	Scio very stony silt loam, 0 to 8 percent slopes	C

Site specific soil evaluations can be found in Appendix A2.1.

2.2 EXISTING SITE CONDITIONS

The development is located on South Kingstown Assessors Plat 16-4 Lot 9. The site has a total area of 118.60 acres, contains 56.7 acres of wetland area. The site is located within the Saugatucket River Watershed. The property is zoned residential R-40 and is surrounded by R-30 and Government and Institutional Zoning. The surrounding areas are serviced by wells, public water, private OWTS, and above ground utilities. The site is entirely wooded with a large wetland complex located through the central area of the site. The wetland edges were delineated by Natural Resource Services, Inc. and field located by DiPrete Engineering. The wetland edges were verified by RIDEM under application #06-0374. The site is located in FEMA flood zone X and this zone is where minimal flooding occurs. The site has a mixture soil types which are classified as B & D soils. All of the proposed development is located within the area of B Soils. These B soils include Scio soils and Narragansett soils which both are suitable for development.

2.3 POST SITE CONDITIONS

The proposed drainage analysis uses stormwater management systems to control and treat runoff from the proposed development. All of the homes with frontage on Old North Road will have bio-retention areas to treat and control storm water runoff from proposed house roofs and driveways to the maximum extent practical. Stone trenches, drywells, and QPAs have also been proposed on these lots to capture the remaining impervious area runoff that could not be directed to the bioretention areas. Storm water runoff from the proposed roadway and remaining homes will be conveyed by a closed drainage network to a sediment forebay, sand filter, and detention basin. All storm water runoff is directed to an existing wetland that is great than 50 acres in size and the length of the system conveying the water is approximately 3,000 linear feet.

The following BMP's are used on site and have been designed to include the following elements:

- Bio Retention Areas
 - Equipped with grass filter strip for pretreatment
 - 2.75' of bioretention soil under bioretention areas for stormwater filtration with 3" of mulch.
 - Stores 75% of WQv
 - Maximum 9" of Ponding
 - Emergency overflow weir
- Drywells

-
- Treatment of roof runoff only so no pretreatment required
 - Fully infiltrate the water quality storm
 - Stone Infiltration Trench
 - Provides water quality treatment
 - QPA's
 - Provides water quality treatment
 - 5% slope maximum
 - Sized per RISDISM
 - Open Channels (Swales)
 - Provide conveyance of stormwater
 - Pretreatment when travel time is greater than 4 minutes
 - Sand Filter
 - Equipped with sediment forebay for pretreatment
 - 2.5' of filter media which shall be ASTM C-33 sand for sand filters with 6" of Loam and Seed.
 - Stores 75% of WQv
 - Safely convey the 100 year storm.
 - Extended Detention Basin
 - All stormwater is treated before entering the stormwater basin
 - Stores Channel Protection Volume (CPv)
 - Provided Overbank Flood Protection (Qp) for the 2-100 year storm events

The above elements will be used to meet the design standards of the Rhode Island Stormwater Design and Installation Standard.

The primary goal of increasing water quality treatment is accomplished by providing water quality BMPs. Stormwater runoff mitigation is provided through the use of bio retention areas, stone infiltration trenches, drywells, sediment forebay, sand filter and a detention pond. By reducing post development stormwater flow rate to a level no greater than the pre development rate for all storm events besides the 1-yr storm, the second goal of the proposed drainage system is achieved. Any potential impact from the proposed development on the abutting properties and wetlands has been mitigated.

There is a minor increase in storm water flows for the 1-yr storm event due to uncontrolled areas within each watershed. These areas include impervious areas directed to QPAs and lawn areas that cannot be controlled. There is insignificant discharge from the detention basin during the 1-yr storm event, which meets all channel protection volume requirements, and the storm water flow increase is due to the change in ground cover type in uncontrolled areas. The wetland on site has a total area of 56.7 acres and there is 0.227 af of volume increase which will result in an additional 0.06" over the entire wetland area which is negligible.

3.0 Minimum Standards

The site has been designed to meet the minimum standards as outlined in the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM) dated November 2018. The following sections outline how the site meets and exceeds the minimum required standards.

3.1 Minimum Standard 1: LID Site Planning and Design Strategies

See Section "Appendix A: Stormwater Management Checklist" from the RISDISM

3.2 Minimum Standard 2: Groundwater Recharge

Groundwater is to be recharged per watershed based impervious area coverage in accordance with section 3.2.2 of the RISDISM.

Groundwater recharge is determined from the following equation:

$$Re_v = 1'' * F * I / 12$$

Where:

Re_v = Groundwater Recharge Volume (ac-ft)

F = Recharge Factor based on Hydrologic Soil Groups (HSG) (see table below)

I = Impervious Area (acres)

HSG	Recharge Factor (F)
A	0.60
B	0.35
C	0.25
D	0.10

Watershed	HSG	F	I (Acres)	Re_v	Re_v Provided
1	B	0.35	4.493	0.131	0.316
2	B	0.35	0.187	0.005	0.000

Recharge volume for watershed 1 is provided through the use of bio-retention areas, drywells, stone trenches, and a sand filter. Recharge volume is not met within watershed 2 because it is an uncontrolled watershed that contains a small amount of proposed roadway, proposed homes, lawn areas, and driveways. We have provided more than double the required recharge volume for watershed 1. Watershed 1 and watershed 2 although analyzed separately ultimate discharge to the same watershed, the Saugatucket River Watershed.

The required recharge volume is based on all impervious area, not just areas which are captured in the proposed BMPs.

See Appendix A3.2 for the water quality storm HydroCAD analysis. The water quality storm is calculated in HydroCAD using the 'calculate separate Pervious/Impervious runoff' option.

3.3 Minimum Standard 3: Water Quality

All stormwater is treated through an approved BMP before being discharged. This site has been designed to use drywells, QPAs, stone infiltration trenches, grass filters strips, bio-retention areas, sediment forebays, and a sand filter to treat stormwater before being discharged to the wetland area. Bio-retention areas are proposed for all the residential lots on Old North Road and drywells, QPA's and stone infiltration trenches are proposed when necessary. Each of these bio-retention areas will have grass filter strips providing pre-treatment to storm water prior to entering the bio-retention area. See bio retention and sand filter design sheets for water quality requirements. Stormwater for the remainder of the residential development will be directed to the proposed roadway and then conveyed by a closed drainage network to a sediment forebay and sand filter that will provide pre-treatment prior to entering the detention basin. The backs of the residential homes including the lawn areas will receive pre-treatment through the existing wooded areas that are considered qualified pervious areas and are well oversized per RIDEM sizing requirements. The site has two design points. The design points discharge to Mitchell Brook and an unnamed stream. Both streams eventually combine with the Saugatucket River. Mitchell Brook and the Saugatucket River are both impaired for Fecal Coliform. The water quality BMPs have been designed to filter and infiltrate the water quality storm to eliminate Fecal Coliform runoff from the proposed development.

Sand Filter Calculations

Sand Filter Sizing

Name of Sand Filter: Sand Filter

<u>Sand Filter Parameters</u>	
At, Total Area to Sand Filter	10.100 (Acres)
Impervious Area To Sand Filter	2.269 (Acres)
d _f , Filter Bed Depth	2.50 (feet)
k, Coefficient of Permeability	3.5 (ft/day)
h _f , Average Height of Water	0.25 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	6 (in)
Loam Depth	6 (in)

Water Quality Calculations

WQ_v = 1inch x Impervious Area
WQ_v = 8,236 (Cubic Feet)

Minimum Size of Sand Filter Filter Area

$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$
Required A_f = 1,070 (Square Feet) Where A_f is the required filter bed area
Provided A_f = 2,990 (Square Feet)

Sand Filter Pre Treatment

Type of Pre Treatment: Sediment Forebay

As = 5,750 * Q Q = %WQ_v / 86,400 %WQ_v = 25%
Required As = 137 (Square Feet), where As is the required forebay Area
Provided As = 710 (Square Feet)

25% of Water Quality Volume must be provided in Forebay
Required Volume = 2,059 (Cubic Feet)
Provided Volume = 2,132 (Cubic Feet)

Required Water Quality Volume

75% of the WQ_v must be held within system (including forebay)
Required WQ_v = 6,177 (Cubic Feet)

Volume of Loam	493 (Cubic Feet)
Volume of Forebay	2,132 (Cubic Feet)
Volume of Ponding	1,583 (Cubic Feet)
Volume of Voids in Filter Bed	2,467 (Cubic Feet)
Total	6,675 (Cubic Feet)

Bio Retention Calculations

Bio-retention calculations were completed for proposed residential lots 1-16. Each of the proposed lots and bio retention areas were sized per RISDISM and modeled in HydroCAD to ensure a maximum of 9 inches of ponding and 6 inches of freeboard. When possible, the front of the proposed homes and a portion of the proposed driveways will be directed to these bio retention areas. The house foot prints and driveway's locations are subject to change at time of construction and bioretention areas must be resized if necessary.

Bioretention Sizing

Name of Bioretention: L1&2

Water Quality Calculations

WQ_v= 1inch x Impervious Area
WQ_v= 1,151 (Cubic Feet)

Minimum Size of Bioretention Filter Area

$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$
Required A_f= 506 (Square Feet) Where A_f is the required filter bed area
Provided A_f= 1,245 (Square Feet)

<u>Bioretention Parameters</u>	
At, Total Area to Bioretention	0.973 (Acres)
Impervious Area To Bioretention	0.317 (Acres)
d _f , Filter Bed Depth	2.75 (feet)
k, Coefficient of Permeability	1.0 (ft/day)
h _f , Average Height of Water	0.38 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	9 (in)
Mulch Depth	3 (in)

Bioretention Pre Treatment

Type of Pre Treatment: Grass Filter Strip

The pretreatment for the Bioretention is provided through a grass filter strip designed per section 6.3 of the RISDISM

Required Water Quality Volume

75% of the WQ_v must be held within system
Required WQ_v 863 (Cubic Feet)

Volume of Mulch 103 (Cubic Feet)

Volume of Ponding 1,517 (Cubic Feet)

Volume of Voids in Filter Bed 1,130 (Cubic Feet)

Total 2,749 (Cubic Feet)

Bioretention Sizing

Name of Bioretention: L3

Water Quality Calculations

WQ_v= 1inch x Impervious Area
WQ_v= 323 (Cubic Feet)

Minimum Size of Bioretention Filter Area

$$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$$

Required A_f= 142 (Square Feet) Where A_f is the required filter bed area

Provided A_f= 431 (Square Feet)

<u>Bioretention Parameters</u>	
At, Total Area to Bioretention	0.147 (Acres)
Impervious Area To Bioretention	0.089 (Acres)
d _f , Filter Bed Depth	2.75 (feet)
k, Coefficient of Permeability	1.0 (ft/day)
h _f , Average Height of Water	0.38 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	9 (in)
Mulch Depth	3 (in)

Bioretention Pre Treatment

Type of Pre Treatment: Grass Filter Strip

The pretreatment for the Bioretention is provided through a grass filter strip designed per section 6.3 of the RISDISM

Required Water Quality Volume

75% of the WQ_v must be held within system

Required WQ_v 242 (Cubic Feet)

Volume of Mulch 36 (Cubic Feet)

Volume of Ponding 353 (Cubic Feet)

Volume of Voids in Filter Bed 391 (Cubic Feet)

Total 779 (Cubic Feet)

Bioretention Sizing

Name of Bioretention: L4&5

Water Quality Calculations

WQ_v= 1inch x Impervious Area
WQ_v= 849 (Cubic Feet)

Minimum Size of Bioretention Filter Area

$$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$$

Required A_f= 374 (Square Feet) Where A_f is the required filter bed area

Provided A_f= 1,362 (Square Feet)

Bioretention Pre Treatment

Type of Pre Treatment: Grass Filter Strip

The pretreatment for the Bioretention is provided through a grass filter strip designed per section 6.3 of the RISDISM

<u>Bioretention Parameters</u>	
At, Total Area to Bioretention	0.423 (Acres)
Impervious Area To Bioretention	0.234 (Acres)
d _f , Filter Bed Depth	2.75 (feet)
k, Coefficient of Permeability	1.0 (ft/day)
h _f , Average Height of Water	0.38 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	9 (in)
Mulch Depth	3 (in)

Required Water Quality Volume

75% of the WQ_v must be held within system
Required WQ_v 637 (Cubic Feet)

Volume of Mulch 112 (Cubic Feet)

Volume of Ponding 1,144 (Cubic Feet)

Volume of Voids in Filter Bed 1,236 (Cubic Feet)

Total 2,492 (Cubic Feet)

Bioretention Sizing

Name of Bioretention: L6&7

Water Quality Calculations

WQ_v= 1inch x Impervious Area
WQ_v= 788 (Cubic Feet)

Minimum Size of Bioretention Filter Area

$$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$$

Required A_f= 347 (Square Feet) Where A_f is the required filter bed area

Provided A_f= 2,040 (Square Feet)

Bioretention Pre Treatment

Type of Pre Treatment: Grass Filter Strip

The pretreatment for the Bioretention is provided through a grass filter strip designed per section 6.3 of the RISDISM

<u>Bioretention Parameters</u>	
At, Total Area to Bioretention	0.373 (Acres)
Impervious Area To Bioretention	0.217 (Acres)
d _f , Filter Bed Depth	2.75 (feet)
k, Coefficient of Permeability	1.0 (ft/day)
h _f , Average Height of Water	0.38 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	9 (in)
Mulch Depth	3 (in)

Required Water Quality Volume

75% of the WQ_v must be held within system

Required WQ_v 591 (Cubic Feet)

Volume of Mulch 168 (Cubic Feet)

Volume of Ponding 1,842 (Cubic Feet)

Volume of Voids in Filter Bed 1,851 (Cubic Feet)

Total 3,861 (Cubic Feet)

Bioretention Sizing

Name of Bioretention: L8&9

Water Quality Calculations

WQ_v= 1inch x Impervious Area
WQ_v= 639 (Cubic Feet)

Minimum Size of Bioretention Filter Area

$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$
Required A_f= 281 (Square Feet) Where A_f is the required filter bed area
Provided A_f= 1,490 (Square Feet)

<u>Bioretention Parameters</u>	
At, Total Area to Bioretention	0.318 (Acres)
Impervious Area To Bioretention	0.176 (Acres)
d _f , Filter Bed Depth	2.75 (feet)
k, Coefficient of Permeability	1.0 (ft/day)
h _f , Average Height of Water	0.38 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	9 (in)
Mulch Depth	3 (in)

Bioretention Pre Treatment

Type of Pre Treatment: Grass Filter Strip

The pretreatment for the Bioretention is provided through a grass filter strip designed per section 6.3 of the RISDISM

Required Water Quality Volume

75% of the WQ_v must be held within system
Required WQ_v 479 (Cubic Feet)

Volume of Mulch 123 (Cubic Feet)

Volume of Ponding 1,294 (Cubic Feet)

Volume of Voids in Filter Bed 1,352 (Cubic Feet)

Total 2,769 (Cubic Feet)

Bioretention Sizing

Name of Bioretention: L10&11

Water Quality Calculations

WQ_v= 1inch x Impervious Area
WQ_v= 679 (Cubic Feet)

Minimum Size of Bioretention Filter Area

$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$
Required A_f= 299 (Square Feet) Where A_f is the required filter bed area
Provided A_f= 2,274 (Square Feet)

<u>Bioretention Parameters</u>	
At, Total Area to Bioretention	0.340 (Acres)
Impervious Area To Bioretention	0.187 (Acres)
d _f , Filter Bed Depth	2.75 (feet)
k, Coefficient of Permeability	1.0 (ft/day)
h _f , Average Height of Water	0.38 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	9 (in)
Mulch Depth	3 (in)

Bioretention Pre Treatment

Type of Pre Treatment: Grass Filter Strip

The pretreatment for the Bioretention is provided through a grass filter strip designed per section 6.3 of the RISDISM

Required Water Quality Volume

75% of the WQ_v must be held within system
Required WQ_v 509 (Cubic Feet)

Volume of Mulch 188 (Cubic Feet)

Volume of Ponding 1,972 (Cubic Feet)

Volume of Voids in Filter Bed 2,064 (Cubic Feet)

Total 4,223 (Cubic Feet)

Bioretention Sizing

Name of Bioretention: L12&13

Water Quality Calculations

WQ_v= 1inch x Impervious Area
WQ_v= 643 (Cubic Feet)

Minimum Size of Bioretention Filter Area

$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$
Required A_f= 283 (Square Feet) Where A_f is the required filter bed area
Provided A_f= 1,820 (Square Feet)

<u>Bioretention Parameters</u>	
At, Total Area to Bioretention	0.297 (Acres)
Impervious Area To Bioretention	0.177 (Acres)
d _f , Filter Bed Depth	2.75 (feet)
k, Coefficient of Permeability	1.0 (ft/day)
h _f , Average Height of Water	0.38 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	9 (in)
Mulch Depth	3 (in)

Bioretention Pre Treatment

Type of Pre Treatment: Grass Filter Strip

The pretreatment for the Bioretention is provided through a grass filter strip designed per section 6.3 of the RISDISM

Required Water Quality Volume

75% of the WQ_v must be held within system
Required WQ_v 482 (Cubic Feet)

Volume of Mulch 150 (Cubic Feet)

Volume of Ponding 1,497 (Cubic Feet)

Volume of Voids in Filter Bed 1,652 (Cubic Feet)

Total 3,299 (Cubic Feet)

Bioretention Sizing

Name of Bioretention: L14

Water Quality Calculations

WQ_v= 1inch x Impervious Area
WQ_v= 1,143 (Cubic Feet)

Minimum Size of Bioretention Filter Area

$$A_f = (WQ_v) \times (d_f) / [(k) \times (h_f + d_f) \times (t_f)]$$

Required A_f= 503 (Square Feet) Where A_f is the required filter bed area

Provided A_f= 350 (Square Feet)

Bioretention Pre Treatment

Type of Pre Treatment: Other

<u>Bioretention Parameters</u>	
At, Total Area to Bioretention	0.973 (Acres)
Impervious Area To Bioretention	0.315 (Acres)
d _f , Filter Bed Depth	2.75 (feet)
k, Coefficient of Permeability	1.0 (ft/day)
h _f , Average Height of Water	0.38 (ft)
t _f , Design Filter Bed Drain Time	2.00 (days)
Ponding Depth	9 (in)
Mulch Depth	3 (in)

Required Water Quality Volume

75% of the WQ_v must be held within system

Required WQ_v 858 (Cubic Feet)

Volume of Mulch 29 (Cubic Feet)

Volume of Ponding 379 (Cubic Feet)

Volume of Voids in Filter Bed 318 (Cubic Feet)

Total 725 (Cubic Feet)

Drywells

Drywells are proposed for roof areas that could not be captured by bioretention areas nor QPAs. Drywells have been sized in HydroCAD to fully infiltrate the water quality storm. Elevations of the drywells have been provided on the plans but are subject to change based on individual lot grading.

Drywell Lot	Depth	Length x Width
8	0.5 FT	10 FT X 9 FT
13	0.5 FT	10 FT X 9 FT
14	0.5 FT	13 FT X 13 FT
15	1 FT	8 FT X 8 FT
16	3 FT	7 FT X 7 FT

QPA's

QPA's were designed per RIDEM stormwater manual, section 4.6.1.1 to treat the rear half of roof areas and some driveways to the maximum extent practicable. The area of proposed impervious was used as the minimum area of proposed QPAs. QPAs that deviate from RIDEM requirements are due to space constraints. Where possible, QPAs are larger than required.

QPA	Proposed Impervious Area	Minimum Length Required	Minimum Width Required	Provided QPA Surface Area	Slope
1A	445 SF	33.46 FT	28 FT	952 SF	-4.69%
1B	755 SF	56.77 FT	50 FT	2,860 SF	-4.41%
2A	755 SF	56.77 FT	50 FT	2,860 SF	-4.29%
2B	445 SF	33.46 FT	28 FT	1,416 SF	-4.15%
3A	445 SF	33.46 FT	28 FT	1,313 SF	-2.80%
3B	755 SF	56.77 FT	50 FT	2,860 SF	-2.53%
4A	445 SF	33.46 FT	28 FT	2,012 SF	-1.87%
4B	755 SF	56.77 FT	50 FT	2,860 SF	-2.53%
5A	755 SF	56.77 FT	50 FT	2,860 SF	-1.68%
5B	445 SF	33.46 FT	28 FT	2,012 SF	-3.33%
6A	445 SF	33.46 FT	28 FT	1,670 SF	-2.57%
6B	755 SF	56.77 FT	50 FT	2,860 SF	-2.34%
6C	755 SF	70.00 FT	20 FT	2,075 SF	-2.34%
7A	755 SF	56.77 FT	50 FT	2,860 SF	-2.26%
7B	445 SF	33.46 FT	28 FT	1,670 SF	-2.26%
8A	755 SF	56.77 FT	50 FT	2,860 SF	-2.26%
8B	1,817 SF	113.77 SF	20 FT	2,508 SF	-1.61%
9A	755 SF	56.77 FT	50 FT	2,860 SF	-2.13%
9B	445 SF	33.46 FT	28 FT	1,670 SF	-2.84%
10A	445 SF	33.46 FT	28 FT	1,670 SF	-2.13%
10B	755 SF	56.77 FT	50 FT	2,860 SF	-2.02%
11A	755 SF	56.77 FT	50 FT	2,860 SF	-2.09%

11B	445 SF	33.46 FT	28 FT	1,670 SF	-2.52%
12A	445 SF	33.46 FT	28 FT	1,670 SF	-2.85%
12B	755 SF	56.77 FT	50 FT	2,860 SF	-2.71%
13	445 SF	33.46 FT	28 FT	1,670 SF	-1.87%
14	770 SF	57.89 FT	70 FT	4,192 SF	-3.12%
15A	794 SF	59.70 FT	70 FT	5,777 SF	-2.20%
15B	2,575 SF	171,70 FT	16 FT	7,149 SF	-1.99%
16	794 SF	59.70 FT	70 FT	6,929 SF	-1.15%

Stone Infiltration Trench

Stone trenches are proposed for driveway areas that could not be captured by bioretention areas nor QPAs. Stone trenches have been sized in HydroCAD to fully infiltrate the water quality storm. Stone trenches are to be 5 feet wide and along the length of driveway that is to be captured. See plans for depths, lengths, and locations. Due to 18" groundwater tables throughout the site, it was not possible to maintain 2 feet of separation for the total length of the stone trenches. Rather than ending the stone trench at the 2 feet of separation, we proposed stone trenches along the total length of the driveway in order to provide treatment to the maximum extent practicable.

3.4 Minimum Standard 4: Conveyance and Natural Channel Protection

Drainage Network Design Parameters:

A. PIPES

- All drainage pipes are RCP or equivalent unless otherwise noted.
- Manning's coefficient = 0.013
- Diameters & lengths as specified
- The 25-year design storm is utilized for the drainage pipe design to ensure that the drainage system contains and channels water to the BMP areas as shown on the plans.
- The rational method has been used for the closed drainage system.

B. STRUCTURES

- Catch basins – Pre-cast concrete with 4' sump unless otherwise noted and inverts as specified
- Manholes – Pre-cast concrete with inverts as specified.

Channel Protection Volume:

The detention basins have been designed to release the 1 year storm volume over a 24 hour time span in accordance with Section 3.2.4 of the RISDISM and RISDISM Guidance for Natural Channel Protection dated June 14, 2017.

The Channel Protection Volume is determined from the following equation:

$$CP_V = 0.65V_r$$

CP_V = required channel protection storage volume

V_r = runoff volume from the 1-year, 24-hour storm (obtained from HydroCAD)

Average release rate, $CP_{qavg} = 0.65 * V_r / T$

Max Release Rate= $CP_{qmax}=2*CP_{qavg}$
 T=extended detention time (24 hours)

The orifice(s) has been sized using HydroCAD to have a max rate twice the average.

CPv Provided by BMP per Receiving Waterbody

Waterbody 1:

BMP / Subcatchment	V _r (cf) To BMPs	CP _v (cf) Required (0.65* V _r)	CP _v (cf) BMP Volume Infiltrated	CP _v (cf) Released by CP _v Orifice	CP _v (cf) Total	CP _v Storage Elev.	Required Max Release Rate (cfs)	Provided Max Release Rate (cfs)
1	36,024	23,416	11,805	14,617	23,416	232.75	0.54	See HCAD

Infiltration is provided within the bio retention areas and the sand filter. The WQ BMPs infiltrate the required CPv volume. Additional CPv is provided within the detention basin.

See Appendix A3.5.4.2 for the 1-year storm event HydroCAD analysis.

3.5 Minimum Standard 5: Overbank Flood Protection & Downstream Analysis

3.5.1 Method of Analysis

USDA Soil Conservation Service Method as defined by Technical Release No. 20 (TR-20) determines Stormwater runoff rate and volume. Type III rainfall distribution is utilized. Time of concentration is determined using Technical Release No 55 (TR-55) methodology, through the computer program *HydroCAD ver. 9.0* by Applied Microcomputer Systems.

The drainage system has been designed to mitigate all stormwater flows for the 10 and 100 year storm events. The emergency outlets have been sized to handle the 100 year storm event.

3.5.2 Design Storm

Analysis of 1-year, 10-year, and 100-year frequency storms are included. The following 24-hour rainfall intensities are obtained from the Rhode Island Stormwater Design and Installation Standards Manual November 2018,

Table 3-1 for Washington County.

1 year = 2.8 inches
 10 year = 4.9 inches
 100 year= 8.5 inches

3.5.3 Design Point Breakdown

The site is analyzed as two watersheds but ultimately all storm water from the development site discharges toward the same wetland complex. All discharge from the wetland complex flows south

toward Mooresfield Road and ends up within the Saugatucket River. In the pre development state there are two watershed areas with one watershed discharging to the wetland complex and the other watershed discharging east off site. In the post development stage the same watersheds are analyzed but there are two watersheds and 22 sub catchments areas. A description of each watershed and associated subcatchments are summarized as follows:

Design Point #1:

Watershed #1 flows to Design Point- 1 (DP-1). Design Point 1 is located at the site boundary where an existing unnamed stream continues off site. Watershed #1 contains sub catchment Pre-1(100) and the area that discharges to the unnamed stream contains existing homes, driveways, grass lawn areas, and a large majority of wooded areas. This watershed had a total area of 128.39 acres, a time of concentration of 49.9 minutes, and curve number of 64. This time of concentration could have been increased by starting the time of concentration closer to Old North Road. This was not analyzed this way because the post development time of concentration would have been increased and using the same time of concentration provides a conservative analysis.

In post development conditions there are 21 sub catchment areas that discharge to Design Point- 1 (DP-1).

Sub catchment Post-1 (101) contains all of the existing homes, driveways, lawn areas along Old North Road and it also includes all the new proposed homes, driveways, and lawn areas along Old North Road that are either undetained or treated for water quality with QPAs.

Sub catchment Post-2 (102) contains proposed homes along Stony Fort Road, approximately 1375 linear feet of proposed roadway, proposed homes, driveways, and lawn areas. All storm water runoff from the front of the proposed homes will be directed to the proposed roadway. The proposed roadway has a closed drainage network that will convey stormwater to a sediment forebay, sand filter, and detention basin. Post-102 has a total area of 10.1 acres, a curve number of 67, and a time of concentration of 23.9 minutes.

Lots 1 and 2 (109, 111, 112A) contain a bioretention area (112) that captures a portion of the driveway and the front halves of the lots' roofs. Pretreatment is by either a swale (110) or a grass filter strip. The remaining driveway area is treated by a stone trench (112B). The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lot 3 contains a bioretention area (114) that captures the driveway and the front halves of the lot's roof and a portion of the driveway. Pretreatment is by a grass filter strip. The remaining driveway area is treated by a stone trench (116). The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lots 4 and 5 (117, 119) contain a bioretention area (118) that captures the driveway and the front halves of the lots' roofs. Pretreatment is by either a swale (120) or a grass filter strip. The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lots 6 and 7 (121, 123) contain a bioretention area (122) that captures the driveway and the front halves of the lots' roofs. Pretreatment is by a grass filter strip. The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lots 8 and 9 (123, 125) contain a bioretention area (124) that captures the driveway and the front halves of the lots' roofs. Pretreatment is by grass filter strip. A portion of Lot 8's roof is treated by a drywell (126). The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lots 10 and 11 (127, 129) contain a bioretention area (128) that captures the driveway and the front halves of the lots' roofs. Pretreatment is by a grass filter strip. The remaining driveway area is treated by a stone trench (134). The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lots 12 and 13 (133, 135) contain a bioretention area (132) that captures the driveway and the front halves of the lots' roofs. Pretreatment is by a grass filter strip. A portion of Lot 8's roof is treated by a drywell (136). The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lot 14 (137, 139) contains a stone trench (138) that captures the driveway and a drywell that captures the front half of the roof (140). The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lot 15 (143) contains a a drywell that captures the front half of the roof (142). The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Lot 16 (143, 145) contains a stone trench (144) that captures the driveway and a drywell that captures the front half of the roof (146). The remaining impervious area is treated by QPAs and the remaining grass area is undetained.

Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point-1.

	Area (acres)	CN	Tc (min)
Pre-100 (100)	128.39	73	49.9
Post-101 (101)	118.471	74	49.9
Post-102 (102)	10.10	78	23.9
L1 & L2 (109)	0.212	90	6.0
L1 & L2 (111)	1.442	75	16.4
L1 & L2 (112A)	0.028	92	6.0
L3 (113)	0.147	88	6.0
L3 (115)	0.019	98	6.0
L4 & L5 (117)	0.331	88	6.0

L4 & L5 (119)	0.092	84	6.0
L6 & L7 (121)	0.357	87	6.0
L6 & L7 (123)	0.318	87	6.0
L8 (125)	0.010	98	6.0
L10 & L11 (121)	0.340	87	6.0
L10 & L11 (129)	0.039	93	6.0
L12 & L13 (131)	0.297	88	6.0
L12 & L13 (133)	0.050	93	6.0
L13 (135)	0.019	98	6.0
L14 (137)	0.054	98	6.0
L14 (139)	0.018	98	6.0
L15 (141)	0.018	98	6.0
L16 (143)	0.058	98	6.0
L16 (143)	0.020	98	6.0

Design Line #2:

Watershed #2 flows to Design Line- 2 (DL-2). Design line 2 is located along the northeast site boundary. In pre development conditions this entire watershed is wooded and storm water from the watershed is not directed toward the existing wetland on site. Storm water from this watershed does however eventually connect back to the wetland complex further south of the development. The area off site that this storm water is directed to contains an existing school and a large area of woods. Sub catchment Pre-2 (200) has a total area of 9.5 acres, a curve number of 55, and a time of concentration of 27.0 minutes. All storm water runoff from this watershed will have to travel through extensive wooded areas prior to entering the stream system so significant treatment will be provided.

In post development conditions there is one sub catchment area that discharges to design line 2 (DP-2). This sub catchment area contains a portion of proposed roadway, proposed homes, driveways, lawn areas, and existing wooded areas. Sub catchment Post-201 (201) has a total area of 5.51 acres, a curve number of 58, and a time of concentration of 18.0 minutes. Although there is an increase in impervious area and a reduction in time of concentration the overall reduction in area allows a reduction in stormwater flows.

	Area (acres)	CN	Tc (min)
Pre-2 (200)	9.50	73	27.0
Post-3 (201)	5.51	72	18.0

3.5.4 Q_p BMP Calculations

The section includes calculations for each Q_p BMP for the site. Calculations include Rip Rap Aprons, Anti Seep Collars, and the Emergency Outlet Calculations.

The emergency overflow weir on the detention basin has been sized to safely pass the 100-year storm and beyond without erosion or excessive velocities. For this analysis, the detention basin was assumed to have all of the orifices clogged and only the emergency overflow weir functioning. Under normal conditions, no stormwater will flow over the emergency spillway and the basin will have a minimum of one foot of freeboard.

Basin	Q(cfs)	V (ft/s)	Top of Basin	Flood Elevation
Basin 1	40.59	3.34	235.00	234.51

The velocity over the spillway is more than 3 ft/s. However, riprap is already provided, thus no erosion will take place on the embankment or downstream. The basin does not overtop even with all orifices clogged and the 100 year storm flowing over the embankment. See attached HydroCAD in Section A3.5.5

Outlet Protection

Rip rap aprons are designed at the drainage pipe discharges and detention basin outlets. The rip rap aprons are designed to prevent scour at the storm water outlet and to minimize the potential for downstream erosion by reducing the velocity of concentrated storm water flows.

Basin 1

$$La = \frac{1.7*Q}{Do^{3/2}} + 8*Do$$

For discharges where Tailwater < 0.5*Do

$$W = 3*Do + La$$

For discharges where Tailwater >= 0.5*Do

La = length of apron

Do = diameter of outlet pipe

W = width of apron

d-50 = median stone diameter

TW = tailwater depth

$$W = 3 \cdot Do + 0.4 \cdot La$$

d-50 is determined by the following formula

$$d-50 = \frac{0.02}{TW} * \frac{Q}{Do}^{4/3}$$

Outlet Protection Table (Sized for 100 Year Storm Event)

Outlet	Discharge (cfs)	Do (ft)	La (ft)	TW* (ft)	W (ft)	d-50 (in)	Riprap Class
FES 1	9.07	1.25	22	1.00	13.00	3	R-3
FES 2	33.56	2.00	37	1.00	21.00	10	R-6
FES 3	29.16	2.00	34	1.00	20.00	9	R-5

Anti Seep Collars Basin 1



The first step in designing the anti-seep collar is to determine the length of pipe within the saturated zone of the embankment. This can be done by using the following equation, assuming that the upstream slope of the embankment intersects the invert of the pipe at its upstream end.

$$Ls = y(z + 4) (1 + (\text{pipe slope} / (0.25 - \text{pipe slope})))$$

$$y = 4.0 \text{ ft (maximum depth of water)}$$

$$z = 3.0 \text{ (slope of upslope embankment ? : 1)}$$

$$\text{slope} = 0.0200 \text{ ft/ft (pipe slope)}$$

$$Ls = 30.4 \text{ ft}$$

The second step in the design process is to establish the number of collars to be used. The equation below can then be used to determine the collar projection beyond the outside wall of the pipe.

Using the equation:

$$\frac{0.15 L}{2 n} = V \quad (\text{for a 15\% increase in flow length})$$

$$L_s = 30.4 \text{ ft}$$

$$n = 2$$

$$\frac{0.15 \times 30.4}{2 \times 2} = 1.14$$

$$V = 1.1 \text{ ft (projection of collar beyond pipe)}$$

Overall Collar Dimensions

$$D = 2 \text{ ft (diameter of pipe)}$$

$$V = 1.1 \text{ ft (projection)}$$

$$OA = 5 \text{ ft (minimum overall dimension of collar)}$$

3.5.5 Downstream Analysis

A downstream analysis is required under the following conditions:

Area of Disturbance (Acres)	Impervious Cover (%)
>5 to 10	>75
>10 to 25	>50
>25 to 50	>25
>50	All Projects

The proposed project disturbs 20.59 acres and is 5.59 acres of impervious. This is approximately 23% impervious cover. A downstream analysis is not required.

3.5.6 Overbank Flood Protection Conclusion

Pre development Conditions versus Post Development Conditions for each watershed are summarized below:

Watershed #1: (DP-1)

Conditions	1-Year	10-Year	100-Year
Pre Dev Summation	43.48 cfs	143.75 cfs	346.56 cfs
Post Dev Summation	43.78 cfs	139.98 cfs	338.28 cfs
Net Change	+0.30 cfs	-3.77 cfs	-8.28 cfs

(cfs = cubic feet per second)

Watershed #2: (DL-2)

Conditions	1-Year	10-Year	100-Year
Pre Dev Summation	4.35 cfs	14.35 cfs	34.51 cfs
Post Dev Summation	2.74 cfs	9.51 cfs	23.33 cfs
Net Change	-1.61 cfs	-4.84 cfs	-11.18 cfs

(cfs = cubic feet per second)

There is a minor increase in storm water flows for the 1-yr storm event due to uncontrolled areas within design point 1. These areas include back of homes and driveways that are treated for water quality by QPAs and lawn areas that cannot be controlled. There is insignificant discharge from the detention basin during the 1-yr storm event, which meets all channel protection volume requirements, and the storm water flow increase is due to the change in ground cover type in uncontrolled areas.

3.6 Minimum Standard 6: Redevelopment and Infill Projects.

The site is not classified as a redevelopment or infill project.

3.7 Minimum Standard 7: Pollution Prevention

A Soil Erosion and Sediment Control Plan (SESC) for this development can be found under a separate document. See the Soil Erosion and Sediment Control Plan for the development prepared by DiPrete Engineering. The SESC contains information for construction pollution prevention. For post construction pollution prevention see the Operations and Maintenance (O&M) document prepared for this development by DiPrete Engineering.

3.8 Minimum Standard 8: Land Uses with High Potential Pollutant Loads (LUHPPs)

The site is not considered LUHHPL.

3.9 Minimum Standard 9: Illicit Discharges

There are no proposed Illicit Discharges on site. The site will be serviced by public water and private OWTS.

3.10 Minimum Standard 10: Construction Erosion and Sedimentation Control

See the SESC for this development prepared by DiPrete Engineering.

3.11 Minimum Standard 11: Stormwater Management System Operation and Maintenance

See the O&M for this development prepared by DiPrete Engineering.

Appendix A

A2.1 Soil Evaluations



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number N/A

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 22, 2007
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Clear, 70° F Shaded: Yes No Time: 2:00 pm

TH 07-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 2/2					fsl	l-sbk	vfr	4
Bw	8-22"	C	W	10YR 5/6					fsl	l-sbk	fri	4
C	22-42"	C	W	2.5Y 6/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	42-96"			2.5Y 5/4					ls	0-m	fri	6
TH 07-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-6"	C	S	10YR 2/2					fsl	l-sbk	vfr	4
Bw	6-21"	C	W	10YR 5/6					fsl	l-sbk	fri	4
C	21-40"	C	W	2.5Y 6/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	40-96"			2.5Y 5/3					ls	0-m	fri	6

Soil Class: Compact Ablation Till
 Depth to Groundwater Seepage: None
 Estimated Seasonal High Water Table: 07-1=20" 07-2=20"

Total Depth of each Test Hole: 07-1=96" 07-2=96"
 Depth to Impervious or Limiting Layer: None
 Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number N/A

Property Owner: Picrme Real Estate Group
 Property Location: Old North Rd AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 22, 2007
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Clear, 70° F Shaded: Yes No Time: 2:00 pm

TH 07-3 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-6"	C	S	10YR 3/3					fsl	1-sbk	vfr	4
Bw	6-21"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	21-38"	C	W	2.5Y 5/3	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	38-96"			2.5Y 5/4					ls	0-m	fri	6
TH 07-4 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-6"	C	S	10YR 3/3					fsl	1-sbk	vfr	4
Bw	6-20"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	20-40"	C	W	2.5Y 5/3	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	40-96"			2.5Y 5/3					ls	0-m	fri	6

Soil Class: Compact Ablation Till Total Depth of each Test Hole: 07-3=96" 07-4=96"
 Depth to Groundwater Seepage: None Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: 07-3=18" 07-4=21" 30 Comments: _____ 30



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number N/A

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 22, 2007
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Clear, 70° F Shaded: Yes No Time: 2:00 pm

TH 07-9 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	10-18"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	18-36"	C	W	2.5Y 6/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	36-96"			2.5Y 5/3					ls	0-m	fri	6
TH 07-10 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	10-22"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	22-40"	C	W	2.5Y 6/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	40-96"			2.5Y 5/3					gls	0-m	fri	6

Soil Class: Compact Ablation Till Total Depth of each Test Hole: 07-9=96" 07-10=96"
 Depth to Groundwater Seepage: None Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: 07-9=19" 07-10=20" 31 Comments: _____ 31



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number N/A

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 22, 2007
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Clear, 70° F Shaded: Yes No Time: 2:00 pm

TH <u>07-11</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR 3/3					fsl	1-sbk	vfr	4
Bw	10-24"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	24-48"	C	W	2.5Y 6/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	48-96"			2.5Y 5/3					ls	0-m	fri	6
TH _____ Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				

Soil Class: Compact Ablation Till Total Depth of each Test Hole: 07-11=96"
 Depth to Groundwater Seepage: None Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: 07-11=22" 32 Comments: _____ 32



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number SDW

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH 29-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"	C	S	10YR 3/4					fsl	1-sbk	vfr	4
Bw	9-18"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	18-36"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	36-96"			2.5Y 5/4					gls	0-m	fri	6
TH 29-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/4					fsl	1-sbk	vfr	4
Bw	8-18"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	18-34"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	34-96"			2.5Y 5/4					gls	0-m	fri	6

Soil Class: Eolian over Ablation Till
 Depth to Groundwater Seepage: None
 Estimated Seasonal High Water Table: 29-1=18" 29-2=18"

Total Depth of each Test Hole: 96"
 Depth to Impervious or Limiting Layer: None
 Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: Picerne Real Estate Group

Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI

Date of Test Hole: October 1-6, 2009

Soil Evaluator: Chris Sutter

License Number: D-4077

Weather: Mostly Clear, 65° F

Shaded: Yes No Time: 2:00 pm

TH <u>1-1</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-18"	C	S	10YR 4/6 10YR 5/6					fsl	1-sbk	fri	4
C	18-46"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	46-96"			2.5Y 5/3					gls	0-m	fri	6
TH <u>1-2</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-19"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	19-33"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	33-96"			2.5Y 6/3					gls	0-m	fri	6

Soil Class: Eolian over Ablation Till

Total Depth of each Test Hole: 96"

Depth to Groundwater Seepage: None

Depth to Impervious or Limiting Layer: None

Estimated Seasonal High Water Table: 1-1=18" 1-2=18"

34 Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number SDW

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH <u>1-3</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-19"	C	S	10YR 4/6 10YR 5/6					fsl	1-sbk	fri	4
C	19-30"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	30-96"			2.5Y 5/3					gls	0-m	fri	6
TH Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				

Soil Class: Eolian over Ablation Till
 Depth to Groundwater Seepage: None
 Estimated Seasonal High Water Table: 1-3=19"

Total Depth of each Test Hole: 96"
 Depth to Impervious or Limiting Layer: None

Comments: _____ 35



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number SDW

Property Owner: Piceme Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH <u>10-1</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	10-20"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	20-37"	C	W	2.5Y 5/3	7.5YR 5/6	C	3	P	fsl	0-m	fri	7
2C	37-96"			2.5Y 6/3					gls/cos	0-m	fri	6
TH <u>10-2</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	10-25"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	25-96"			2.5Y 6/3	7.5YR 5/8	C	3	P	gls	0-m	fri	6

Soil Class: Eolian over Ablation Till Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: None Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: 10-1=18" 10-2=18" 36 Comments: _____ 36



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH 27-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	9-20"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	20-33"	C	W	2.5Y 5/4	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	33-96"			2.5Y 6/3					gls	0-m	fri	6
TH 27-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-20"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	20-39"	C	W	2.5Y 5/3	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	39-96"			2.5Y 6/3					gls	0-m	fri	6

Soil Class: Eolian over Ablation Till
 Depth to Groundwater Seepage: None
 Estimated Seasonal High Water Table: 27-1=20" 27-2=20"
 Total Depth of each Test Hole: 96"
 Depth to Impervious or Limiting Layer: None
 Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH 27-3 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-7"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	7-19"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	19-36"	C	W	2.5Y 5/4	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	36-96"			2.5Y 6/3					gls	0-m	fri	6
TH 27-4 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-8"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	18-35"	C	W	2.5Y 5/3	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	35-96"			2.5Y 6/3					gls	0-m	fri	6

Soil Class: Eolian over Ablation Till
 Depth to Groundwater Seepage: None
 Estimated Seasonal High Water Table: 27-3=18" 27-4=18"
 Total Depth of each Test Hole: 96"
 Depth to Impervious or Limiting Layer: None
 Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
Part A - Soil Profile Description

Application Number SDW

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH 28-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-19"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	19-32"	C	W	2.5Y 5/4	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	32-96"			2.5Y 6/3					gls	0-m	fri	6
TH 28-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-9"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	19-38"	C	W	2.5Y 5/3	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	38-96"			2.5Y 6/3					gls	0-m	fri	6

Soil Class: Eolian over Ablation Till Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: None Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: 28-1=18" 28-2=20" Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources

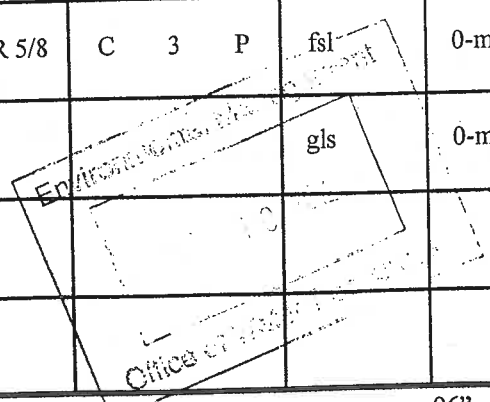


Site Evaluation Form
Part A - Soil Profile Description

Application Number SDW

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH 28-3 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-7"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	7-19"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	19-33"	C	W	2.5Y 5/3	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	33-96"			2.5Y 5/4					gls	0-m	fri	6
TH 28-4 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-9"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	19-38"	C	W	2.5Y 5/3	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	38-96"			2.5Y 5/4					gls	0-m	fri	6



Soil Class: Eolian over Ablation Till Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: None Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: 28-3=18" 28-4=18" Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
Part A - Soil Profile Description

Application Number SDW

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH OS-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-6"	C	S	10YR 3/4					fsl	1-sbk	vfr	4
Bw	6-18"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	18-34"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	34-96"			2.5Y 5/4					gls	0-m	fri	6
TH OS-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-7"	C	S	10YR 3/4					fsl	1-sbk	vfr	4
Bw	7-20"	C	W	10YR 4/6					fsl	1-sbk	fri	4
C	20-34"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	34-96"			2.5Y 5/4					gls	0-m	fri	6

Soil Class: Eolian over Ablation Till Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: None Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: OS-1=18" OS-2=18" Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC
 Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI
 Date of Test Hole: SEPTEMBER 12, 2012
 Soil Evaluator: CHRIS SUTTER License Number: D-4077
 Weather: CLEAR, 75°F Shaded: Yes No Time: 12:00 PM

TH 2012-32 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR2.3/2					fsl	1-sbk.	fri	4
Bw	10-20"	C	S	10YR2.4/6					fsl	1-sbk.	fri	4
BC	20-31"	C	W	5.5Y5/4	7.5YR5/8	C	2	D	fsl/ ufsl	0-m	fri	7
C	31-44"	C	W	2.5Y5/2	7.5YR5/8	C	3	P	ufsl	0-m	fri	7
2C	44-96"			2.5Y5/4					gls	0-m	fri	6
TH 2012-33 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"	C	S	10YR2.3/2					fsl	1-sbk	fri	4
Bw	9-21"	C	S	10YR2.4/6					fsl	1-sbk	fri	4
BC	21-35"	C	W	5.5Y5/4	7.5YR5/6	C	2	D	fsl/ ufsl	0-m	fri	7
C	35-54"	C	W	2.5Y5/2	7.5YR5/8	C	3	P	ufsl	0-m	fri	4
2C	54-96"			2.5Y5/4					gls	0-m	fri	6

Soil Class: FOLIAN OVER Abolition Till Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: NONE Depth to Impervious or Limiting Layer: NONE
 Estimated Seasonal High Water Table: 2012-32 = 20" 2012-33 = 21" Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources

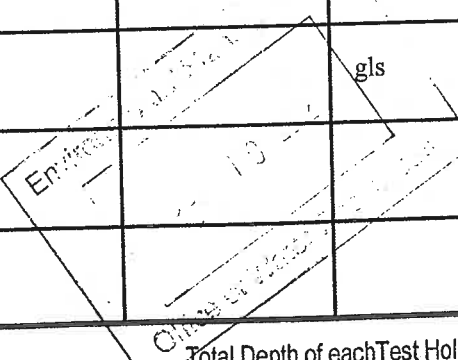


Site Evaluation Form
Part A - Soil Profile Description

Application Number SDW

Property Owner: Picerne Real Estate Group
 Property Location: Old North Rd. AP 16/4 Lot 9 South Kingstown, RI
 Date of Test Hole: October 1-6, 2009
 Soil Evaluator: Chris Sutter License Number: D-4077
 Weather: Mostly Clear, 65° F Shaded: Yes No Time: 2:00 pm

TH 14-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	8-19"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	19-37"	C	W	2.5Y 5/3	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	37-96"			2.5Y 6/3					gls	0-m	fri	6
TH 14-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR 3/2					fsl	1-sbk	vfr	4
Bw	10-18"	C	W	10YR 5/6					fsl	1-sbk	fri	4
C	18-35"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	35-96"			2.5Y 6/3					gls	0-m	fri	6



Soil Class: Eolian over Ablation Till Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: None Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: 14-1=18" 14-2=18" Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 Lot 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

Soil Evaluator: CHRIS SUTTER

License Number: D-4077

Weather: CLEAR, 75°F

Shaded: Yes No Time: 12:00 PM

TH2012-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR2.3/1					fsl	1-sbk	vfr	4
Bw	8-20"	C	S	10YR2.4/6					fsl	1-sbk	fri	4
C	2-40"	C	W	2.5Y5/2	7.5YR2.5/8	C	3	P	ufsl	0-m	fri	7
2C	40-96"			2.5Y5/4					gls	0-m	fri	6
TH2012-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-7"	C	S	10YR2.3/2					fsl	1-sbk	vfr	4
Bw	7-19"	C	S	10YR2.4/6					fsl	1-sbk	fri	4
C	19-36"	C	W	2.5Y5/2	7.5YR2.5/8	C	3	P	ufsl	0-m	fri	7
2C	36-96"			2.5Y5/4					gls	0-m	fri	6

Soil Class: Epilon over Ablation Till

Total Depth of each Test Hole: 96"

Depth to Groundwater Seepage: NONE

Depth to Impervious or Limiting Layer: NONE

Estimated Seasonal High Water Table: 2012-1 = 20" 2012-2 = 19"

Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

License Number: D-4077

Soil Evaluator: CHRIS SUTTER

Shaded: Yes No Time: 12:00 PM

Weather: CLEAR, 75°F

TH2012-3 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-7"	C	S	10YR3/2					fsl	1-sbk	vfr	4
Bw	7-20"	C	S	10YR4/6	7.5YR2.5/6 @ 18"	F	2	P	fsl	1-sbk	fri	4
C	20-37"	C	W	2.5Y5/3	7.5YR2.5/8	C	3	P	ufsl	0-m	fri	7
ZC	37-96"			2.5Y5/4					gls	0-m	fri	6
TH2012-4 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-8"	C	S	10YR3/2					fsl	1-sbk	vfr	4
Bw	8-20"	C	S	10YR5/4	7.5YR2.5/6 @ 19"	F	2	P	fsl	1-sbk	fri	4
C	20-39"	C	W	2.5Y5/3	7.5YR2.5/8	C	3	P	ufsl	0-m	fri	7
ZC	39-96"			2.5Y5/4					gls	0-m	fri	6

Environmental Management
 OCT 10 2012
 Office of Water Resources

Soil Class: FOLIAR OVER Abolition Till

Total Depth of each Test Hole: 96"

Depth to Groundwater Seepage: NONE

Depth to Impervious or Limiting Layer: NONE

Estimated Seasonal High Water Table: 2012-3 = 18" 2012-4 = 19"

Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management

Office of Water Resources



Site Evaluation Form

Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

Soil Evaluator: CHRIS SUITER

License Number: D-4077

Weather: CLEAR, 75°F

Shaded: Yes No Time: 12:00 PM

TH2012-5 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"	C	S	10YR2/2					fsl	1-sbk	ufr	4
Bw	9-21"	C	S	10YR2/6					fsl	1-sbk	fri	4
BC	21-26"	C	W	2.5Y5/4	7.5YR5/6	C	2	P	sl/ufsl	0-m	fri	7
C	26-40"	C	W	2.5Y5/3	7.5YR5/8	C	3	P	ufsl	0-m	fri	7
2C	40-96"			2.5Y5/4					gls	0-m	fri	6
TH2012-6 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR2/2					fsl	1-sbk	ufr	4
Bw	8-21"	C	S	10YR2/6					fsl	1-sbk	fri	4
BC	21-28"	C	W	2.5Y5/4	7.5YR5/6	C	2	P	sl/ufsl	0-m	fri	7
C	28-40"	C	W	2.5Y5/3	7.5YR5/8	C	3	P	ufsl	0-m	fri	7
2C	40-96"			2.5Y5/4					gls	0-m	fri	6

Soil Class: FOLLON OVER ABLESTON TILL

Total Depth of each Test Hole: 96"

Depth to Groundwater Seepage: NONE

Depth to Impervious or Limiting Layer: NONE

Estimated Seasonal High Water Table: 2012-5=20" 2012-6=19"

Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 Lot 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

Soil Evaluator: CHRIS SUTER

License Number: D-4077

Weather: Clear, 75°F

Shaded: Yes No Time: 12:00 PM

TH2012-7 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-8"	C	S	10YR 3/1					fsl	1-5bk	ufr	4
Bw1	8-20"	C	S	10YR 5/6					fsl	1-5bk	fri	4
Bw2	20-25"	C	S	2.5Y 5/6	10YR 5/8 3 21"	F	2	F	fsl	1-5bk	fri	4
C	25-48"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	ufsl	0-m	fri	7
2C	48-96"			2.5Y 5/4					gls	0-m	fri	6
TH2012-8 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-10"	C	S	10YR 3/1					fsl	1-5bk	ufr	4
Bw1	10-19"	C	S	10YR 5/6					fsl	1-5bk	fri	4
Bw2	19-29"	C	W	2.5Y 5/6	10YR 5/8 3 19"	F	2	F	fsl	1-5bk	fri	4
C	29-46"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	ufsl	0-m	fri	7
2C	46-96"			2.5Y 5/4					gls	0-m	fri	6

Soil Class: Euilan over Ablonon Tlu

Total Depth of each Test Hole: 96"

Depth to Groundwater Seepage: NONE

Depth to Impervious or Limiting Layer: NONE

Estimated Seasonal High Water Table: 2012-75-2" 2012-8-19"

Comments:



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

License Number: D-4077

Soil Evaluator: CHRIS SUTTER

Shaded: Yes No Time: 12:00 PM

Weather: CLEAR, 75°F

TH2012-9 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
A	0-6"	C	S	10YR3/2					fsl	1-sbk	fri	4
Bw1	6-19"	C	S	10YR5/6					fsl	1-sbk	fri	4
Bw2	19-26"	C	W	10YR5/4	7.5YR5/8	C	2	P	fsl	1-sbk	fri	4
C	26-44"	C	W	2.5Y5/2	7.5YR5/8	C	3	P	vfsl	0-m	fri	7
ZC	44-96"			2.5Y5/4					gls	0-m	fri	6
TH2012-10 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-8"	C	S	10YR3/2					fsl	1-sbk	fri	4
BW	8-21"	C	S	10YR4/6					fsl	1-sbk	fri	4
BC	21-28"	C	W	10YR5/6	7.5YR5/6	C	2	P	fsl	0-m	fri	7
C	28-40"	C	W	2.5Y5/2	7.5YR5/8	C	3	P	vfsl	0-m	fri	7
ZC	40-96"			7.5YR5/8	Emm				gls	0-m	fri	6

Soil Class: FOLIAN OVER Ablation Till

Depth to Groundwater Seepage: NONE

Estimated Seasonal High Water Table: 2012-9=19" 2012-10=21"

Total Depth of each Test Hole: 96"

Depth to Impervious or Limiting Layer: NONE

Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 LOT 9, SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

License Number: D-4077

Soil Evaluator: CHRIS SWITZER

Shaded: Yes No Time: 12:00 PM

Weather: Clear, 75°F

TH 2012-11 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
A	0-10"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw1	10-18"	C	S	10YR 5/6					fsl	1-sbk	fri	4
Bw2	18-27"	C	W	2.5Y 5/6	7.5YR 5/6	C	2	D	fsl	1-sbk	fri	4
C	27-41"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	vfsl	0-m	fri	7
2C	41-96"			2.5Y 5/4					gls	0-m	fri	6
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Environmental 10 10 12 </div>												
TH 2012-12 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw	10-19"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	19-46"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	vfsl	0-m	fri	7
2C	46-96"			2.5Y 5/4					gls	0-m	fri	6

Soil Class: Entisol over Abolition Till

Depth to Groundwater Seepage: NONE

Total Depth of each Test Hole: 96"

Depth to Impervious or Limiting Layer: NONE

Estimated Seasonal High Water Table: 2012-11-18" 2012-12-18"

Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

Soil Evaluator: CHRIS SUTER

License Number: D-4077

Weather: CLEAR, 75°F

Shaded: Yes No Time: 12:00 PM

TH 2012-13 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
A	0-8"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw1	8-18"	C	S	10YR 5/6					fsl	1-sbk	fri	4
Bw2	18-24"	C	S	10YR 5/6	2.5YR 5/6	C	2	D	fsl	1-sbk	fri	4
C	24-38"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	vfsl	0-m	fri	7
2C	38-96"			2.5Y 5/4					gls	0-m	fri	6
TH 2012-14 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
A	0-10"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw	10-20"	C	S	10YR 5/6					fsl	1-sbk	fri	4
C	20-35"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	vfsl	0-m	fri	7
2C	35-96"			2.5Y 5/4					gls	0-m	fri	6

Emitted on 10/12/12

Soil Class: Episodic Over Ablation Tilt

Depth to Groundwater Seepage: NONE

Estimated Seasonal High Water Table: 2012-13 = 18" - 2012-14 = 19"

Total Depth of each Test Hole: _____

Depth to Impervious or Limiting Layer: _____

Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC
 Property Location: OLD NORTH RD AP16-4 Lot 9 SOUTH KINGSTOWN, RI
 Date of Test Hole: SEPTEMBER 12, 2012
 Soil Evaluator: CHRIS SWITZER License Number: D-9077
 Weather: CLEAR, 75°F Shaded: Yes No Time: 12:00 PM

TH 2012-16 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw	8-22"	C	S	10YR 5/6					fsl	1-sbk	fri	4
Bc	22-30"	C	W	2.5Y 5/6	7.5YR 5/6	C	2	P	fsl	1-sbk	fri	4
C	30-45"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	ufsl	0-m	fri	7
Zc	45-96"			2.5Y 5/4					gls	0-m	fri	6
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> EMPLOYED BY THE STATE OF RHODE ISLAND SEP 10 2012 CHRIS SWITZER </div>												
TH 2012-17 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw	10-19"	C	S	10YR 5/6					fsl	1-sbk	fri	4
C	19-30"	C	W	2.5Y 7/2	7.5YR 5/8	C	3	P	ufsl	0-m	fri	7
Zc	30-96"			2.5Y 5/4					gls	0-m	fri	6

Soil Class: FOLIAN OVER ABLOTION TIL Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: NONE Depth to Impervious or Limiting Layer: NONE
 Estimated Seasonal High Water Table: 2012-16 = 21" - 2012-17 = 19" Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 Lot 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

Soil Evaluator: CHRIS SUTTER

License Number: D-4077

Weather: CLEAR, 75°F

Shaded: Yes No Time: 12:00 PM

TH 2012-18 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-10"	C	S	10YR 3/2					fsl	1-sbk	ufr	4
Bw1	10-20"	C	S	10YR 4/6					fsl	1-sbk	fri	4
Bw2	20-26"	C	W	10YR 5/6	2.5YR 5/6	C	2	D	fsl	1-sbk	fri	4
C	26-50"	C	W	2.5Y 5/2	2.5YR 5/8	C	3	P	vfsl	0-m	fri	7
2C	50-96"			2.5Y 5/4					gls	0-m	fri	6
TH 2012-19 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
A	0-10"	C	S	10YR 3/2					fsl	1-sbk	vfri	4
Bw	10-21"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	21-45"	C	W	2.5Y 5/2	2.5YR 5/8	C	3	P	vfsl	0-m	fri	7
2C	45-96"			2.5Y 5/4					gls	0-m	fri	6

Soil Class: Epillic over Abolition Tlc.

Depth to Groundwater Seepage: NONE

Estimated Seasonal High Water Table: 2012-18 = 21" 2012-19 = 20"

Total Depth of each Test Hole: 96"

Depth to Impervious or Limiting Layer: NONE

Comments: -----



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form

Part A - Soil Profile Description

Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

Soil Evaluator: CHRIS SUTER

License Number: D-4077

Weather: CLEAR, 75°F

Shaded: Yes No Time: 12:00 PM

TH2012-22 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-10"	C	S	10YR2.5/2					fsl	1-sbk	fri	4
Bw	10-21"	C	S	10YR5/6					fsl	1-sbk	fri	4
C	21-34"	C	W	2.5Y5/2	7.5YR5/8	C	3	P	v-fsl	0-m	fri	7
2C	34-96"			2.5Y5/4					gls	0-m	fri	6
TH2012-23 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
Horizon	Depth	Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR2.5/2					fsl	1-sbk	fri	4
Bw	8-20"	C	S	10YR5/6					fsl	1-sbk	fri	4
C	20-40"	C	W	2.5Y5/2	7.5YR5/8	C	3	P	v-fsl	0-m	fri	7
2C	40-96"			2.5Y5/4					gls	0-m	fri	6

Soil Class: FOLIAR OVER ABLOTION TIL

Total Depth of each Test Hole: 96"

Depth to Groundwater Seepage: NONE

Depth to Impervious or Limiting Layer: NONE

Estimated Seasonal High Water Table: 2012: 22-28" 2012-23: 20"

Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC
 Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI
 Date of Test Hole: SEPTEMBER 12, 2012
 Soil Evaluator: CHRIS SWITZER License Number: D-4077
 Weather: CLEAR, 75°F Shaded: Yes No Time: 12:00 PM

TH 2012-24 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-9"	C	S	10YR 2/2					fsl	1-sbk	fri	4
Bw	9-20"	C	S	10YR 5/6					fsl	1-sbk	fri	4
C	20-32"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	vfsl	0-m	fri	7
Zc	32-96"			2.5Y 5/4					gls	0-m	fri	6
TH 2012-25 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
Ap	0-8"	C	S	10YR 2/2					fsl	1-sbk	fri	4
Bw	8-22"	C	S	10YR 5/6					fsl	1-sbk	fri	4
C	22-40"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	vfsl	0-m	fri	7
Zc	40-96"			2.5Y 5/4					gls	0-m	fri	6

Soil Class: FOLIAR OVER ABLATION TIL Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: NONE Depth to Impervious or Limiting Layer: NONE
 Estimated Seasonal High Water Table: 2012-24 = 20" 2012-25 = 20" Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management

Office of Water Resources



Site Evaluation Form

Part A - Soil Profile Description

Application Number

SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC

Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI

Date of Test Hole: SEPTEMBER 12, 2012

Soil Evaluator: CHRIS SUTTER

License Number: D-4077

Weather: CLEAR, 75°F

Shaded: Yes [] No [x] Time: 12:00 PM

TH 2012-26 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-9"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw1	9-18"	C	S	2.5Y 5/6 2.5Y 5/4*					fsl	1-sbk	fri	4
Bw2	18-22"	C	W	2.5Y 5/4	7.5YR 5/6	C	2	D	fsl	1-sbk	fri	4
C	22-40"	C	W	2.5Y 5/2	2.5YR 5/8	C	3	P	vfsl	0-m	fri	7
ZC	40-96"			2.5Y 5/4					gls	0-m	fri	6
TH 2012-27 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-8"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw	8-19"	C	S	10YR 5/6					fsl	1-sbk	fri	4
BC	19-28"	C	S	10YR 5/6 2.5Y 5/4	7.5YR 5/6	C	2	D	fsl	1-sbk	fri	4
C	28-44"	C	W	2.5Y 5/2	7.5YR 5/8	C	3	P	vfsl	0-m	fri	7
ZC	44-96"			2.5Y 5/4	Enrichment				gls	0-m	fri	6

Soil Class: FOLIAR OUSL ABLATION TILL

Depth to Groundwater Seepage: NONE

Estimated Seasonal High Water Table: 2012-26 = 18" 2012-27 = 19"

Total Depth of each Test Hole: 96"

Depth to Impervious or Limiting Layer: NONE

Comments:

* 2 MATRIX COLORS IN Bw1 - 2.5Y 5/6 (DOMINANT) w/ INCLUSIONS OF 2.5Y 5/4



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description Application Number SDW

Property Owner: OLD NORTH LAND INVESTMENTS, LLC
 Property Location: OLD NORTH RD AP16-4 LOT 9 SOUTH KINGSTOWN, RI
 Date of Test Hole: SEPTEMBER 12, 2012
 Soil Evaluator: CHRIS SUTER License Number: D-4077
 Weather: CLEAR, 75°F Shaded: Yes No Time: 12:00 PM

TH <u>2012-28</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-10"	C	S	10YR3/2					fsl	1-sbk	fri	4
Bw1	10-20"	C	S	10YR4/6					fsl	1-sbk	fri	4
Bw2	20-26"	C	W	10YR5/6	7.5YR5/8	C	2	P	fsl	1-sbk	fri	4
C	26-36"	C	W	2.5Y5/2	7.5YR5/8	C	3	P	ufsl	0-m	fri	7
2C	36-96"			2.5Y5/4					gls	0-m	fri	6
TH <u>2012-27</u>												
TH <u>2012-27</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-10"	C	S	10YR3/2					fsl	1-sbk	fri	4
Bw	10-20"	C	W	10YR5/6					fsl	1-sbk	fri	4
C	20-40"	C	W	2.5Y5/3	7.5YR5/8	C	3	P	ufsl	0-m	fri	7
2C	40-96"			2.5Y5/4					gls	0-m	fn	6

Soil Class: FOUR OVER ABSTENTION TUE
 Depth to Groundwater Seepage: NONE
 Estimated Seasonal High Water Table: 2012-28 = 20" 2012-29 = 19"
 Total Depth of each Test Hole: 96"
 Depth to Impervious or Limiting Layer: NONE
 Comments: _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number SDW

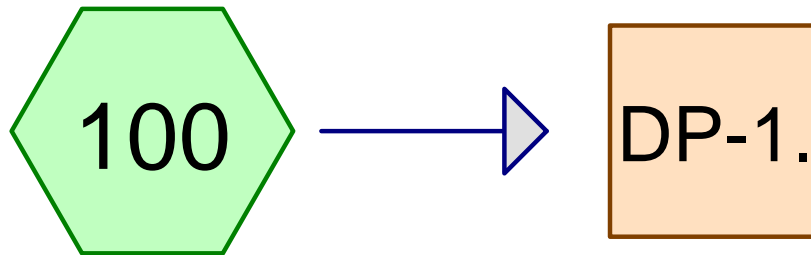
Property Owner: OLD NORTH LAND INVESTMENTS, LLC
 Property Location: OLD NORTH RD AP16-4 Lot 9 SOUTH KINGSTOWN, RI
 Date of Test Hole: SEPTEMBER 12, 2012
 Soil Evaluator: CHRIS SUTTER License Number: D-4077
 Weather: CLEAR, 75°F Shaded: Yes No Time: 12:00 PM

TH <u>2012-30</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
AP	0-8"	C	S	10YR3/2					fsl	1-sbk	fri	4
Bw1	8-20"	C	S	10YR2.5/6					fsl	1-sbk	fri	4
Bw2	20-30"	C	W	2.5YR5/6	2.5YR2.5/6	C	2	D	fsl	1-sbk	fri	4
C	30-40"	C	W	2.5YR2	2.5YR2.5/8	C	3	P	vfsl	0-m	fri	7
2C	40-96"			2.5YR5/4					gls	0-m	fri	6

Emitted
 2012
 Office of Water Resources

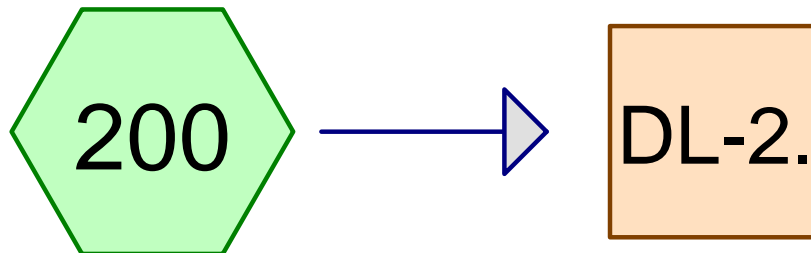
Soil Class: FOLIAR OVER Abolition TIL Total Depth of each Test Hole: 96"
 Depth to Groundwater Seepage: NONE Depth to Impervious or Limiting Layer: NONE
 Estimated Seasonal High Water Table: 2012-30 = 20" Comments: _____

A3.2 Node Diagram and Water Quality HydroCAD 1.2" Storm Analysis



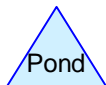
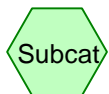
Subcat 100 Ex

Design Line 1



Subcat 200 Ex

Design Line 2



Routing Diagram for 0161-184-ALLS-EPHCD-INHS
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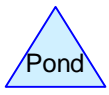
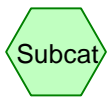
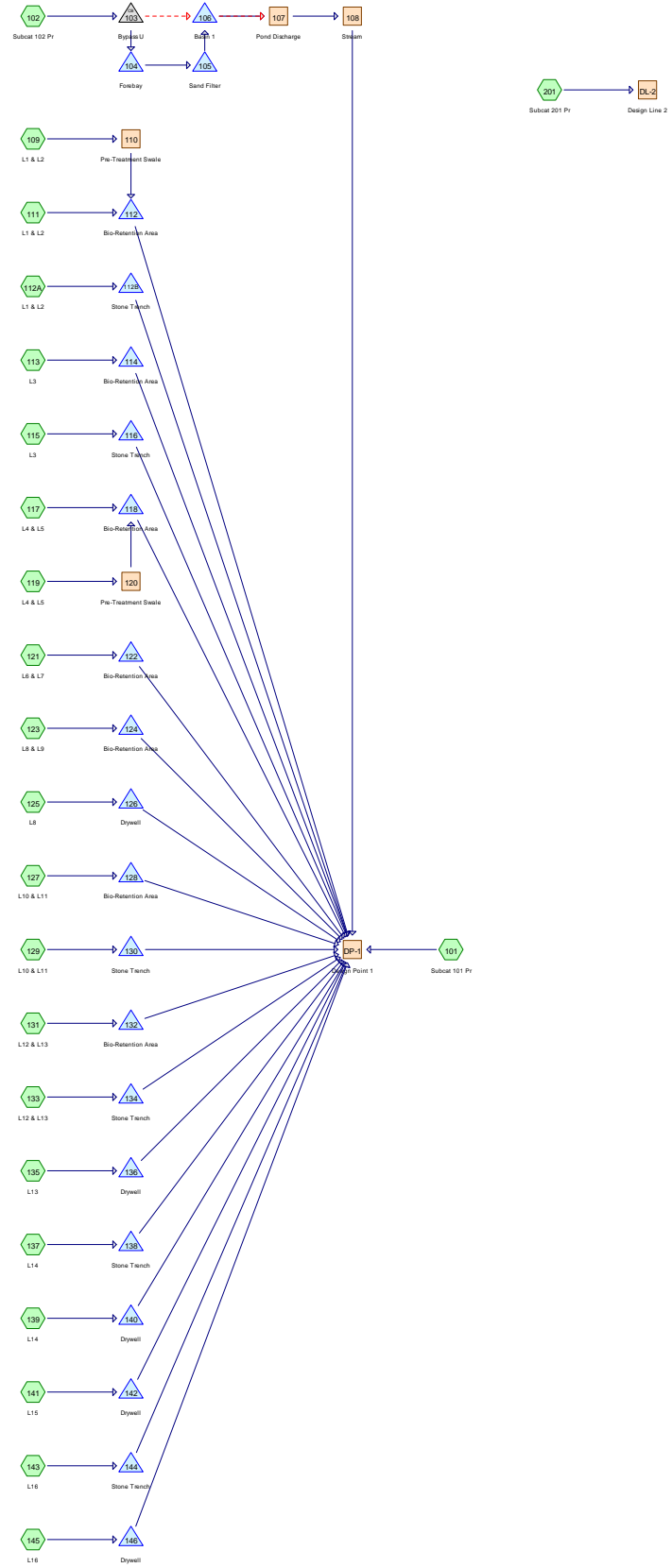
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
19.304	74	>75% Grass cover, Good, HSG C (100, 200)
0.190	80	>75% Grass cover, Good, HSG D (100)
1.220	98	Impervious (100)
73.706	70	Woods, Good, HSG C (100, 200)
43.440	77	Woods, Good, HSG D (100)
137.860	73	TOTAL AREA



Routing Diagram for 0161-184-ALLS-EPHCD-INHS
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
15.899	74	>75% Grass cover, Good, HSG B (0.44 to Bio) (101)
6.438	74	>75% Grass cover, Good, HSG C (102, 109, 111, 112A, 113, 117, 119, 121, 123, 127, 129, 131, 133, 201)
0.190	80	>75% Grass cover, Good, HSG D (101)
0.027	98	Driveway Lots 6 and 7 (101)
0.041	98	Driveway Lots 8 and 9 (101)
1.079	98	Driveways (109, 111, 112A, 113, 115, 117, 119, 121, 123, 127, 129, 131, 133, 137)
1.220	98	Existing Impervious Area (101)
0.447	98	Front of Large Homes (111, 113, 117, 121, 123, 127, 131)
0.159	98	Paved parking, HSG A (102)
0.220	98	Paved parking, HSG C (101, 201)
0.742	98	Proposed Driveways (102, 201)
0.680	98	Proposed Homes (102, 201)
0.336	98	Proposed Homes (0.52 to Bio) (101)
0.700	98	Proposed Road (102)
0.070	98	Roadway (201)
0.141	98	Roof (125, 135, 139, 141, 143, 145)
66.061	70	Woods, Good, HSG C (101, 102, 111, 201)
43.440	77	Woods, Good, HSG D (101)
137.890	74	TOTAL AREA

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: Subcat 101 Pr	Runoff Area=118.471 ac 1.52% Impervious Runoff Depth=0.07" Flow Length=3,830' Tc=49.9 min CN=73/98 Runoff=1.27 cfs 0.643 af
Subcatchment 102: Subcat 102 Pr	Runoff Area=10.042 ac 22.02% Impervious Runoff Depth=0.25" Flow Length=1,646' Tc=23.9 min CN=72/98 Runoff=1.53 cfs 0.209 af
Subcatchment 109: L1 & L2	Runoff Area=0.212 ac 65.09% Impervious Runoff Depth=0.66" Tc=6.0 min CN=74/98 Runoff=0.15 cfs 0.012 af
Subcatchment 111: L1 & L2	Runoff Area=1.442 ac 12.27% Impervious Runoff Depth=0.16" Flow Length=283' Tc=16.4 min CN=72/98 Runoff=0.14 cfs 0.019 af
Subcatchment 112A: L1 & L2	Runoff Area=0.028 ac 75.00% Impervious Runoff Depth=0.75" Tc=6.0 min CN=74/98 Runoff=0.02 cfs 0.002 af
Subcatchment 113: L3	Runoff Area=0.147 ac 59.86% Impervious Runoff Depth=0.61" Tc=6.0 min CN=74/98 Runoff=0.10 cfs 0.008 af
Subcatchment 115: L3	Runoff Area=0.019 ac 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.02 cfs 0.002 af
Subcatchment 117: L4 & L5	Runoff Area=0.331 ac 58.91% Impervious Runoff Depth=0.61" Tc=6.0 min CN=74/98 Runoff=0.21 cfs 0.017 af
Subcatchment 119: L4 & L5	Runoff Area=0.092 ac 41.30% Impervious Runoff Depth=0.44" Tc=6.0 min CN=74/98 Runoff=0.04 cfs 0.003 af
Subcatchment 121: L6 & L7	Runoff Area=0.357 ac 52.94% Impervious Runoff Depth=0.55" Tc=6.0 min CN=74/98 Runoff=0.21 cfs 0.016 af
Subcatchment 123: L8 & L9	Runoff Area=0.318 ac 55.03% Impervious Runoff Depth=0.57" Tc=6.0 min CN=74/98 Runoff=0.19 cfs 0.015 af
Subcatchment 125: L8	Runoff Area=0.010 ac 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.01 cfs 0.001 af
Subcatchment 127: L10 & L11	Runoff Area=0.340 ac 54.71% Impervious Runoff Depth=0.57" Tc=6.0 min CN=74/98 Runoff=0.20 cfs 0.016 af
Subcatchment 129: L10 & L11	Runoff Area=0.039 ac 79.49% Impervious Runoff Depth=0.80" Tc=6.0 min CN=74/98 Runoff=0.03 cfs 0.003 af
Subcatchment 131: L12 & L13	Runoff Area=0.297 ac 59.26% Impervious Runoff Depth=0.61" Tc=6.0 min CN=74/98 Runoff=0.19 cfs 0.015 af
Subcatchment 133: L12 & L13	Runoff Area=0.050 ac 78.00% Impervious Runoff Depth=0.78" Tc=6.0 min CN=74/98 Runoff=0.04 cfs 0.003 af

Subcatchment 135: L13	Runoff Area=0.017 ac 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.02 cfs 0.001 af
Subcatchment 137: L14	Runoff Area=0.054 ac 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.06 cfs 0.004 af
Subcatchment 139: L14	Runoff Area=0.018 ac 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.02 cfs 0.001 af
Subcatchment 141: L15	Runoff Area=0.018 ac 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.02 cfs 0.001 af
Subcatchment 143: L16	Runoff Area=0.058 ac 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.06 cfs 0.005 af
Subcatchment 145: L16	Runoff Area=0.020 ac 100.00% Impervious Runoff Depth=0.99" Tc=6.0 min CN=0/98 Runoff=0.02 cfs 0.002 af
Subcatchment 201: Subcat 201 Pr	Runoff Area=5.510 ac 3.39% Impervious Runoff Depth=0.07" Flow Length=100' Slope=0.0300 '/' Tc=18.0 min CN=71/98 Runoff=0.15 cfs 0.030 af
Reach 107: Pond Discharge	Avg. Flow Depth=0.00' Max Vel=0.02 fps Inflow=0.00 cfs 0.000 af n=0.400 L=1,214.0' S=0.0229 '/' Capacity=85.73 cfs Outflow=0.00 cfs 0.000 af
Reach 108: Stream	Avg. Flow Depth=0.00' Max Vel=0.13 fps Inflow=0.00 cfs 0.000 af n=0.030 L=2,015.0' S=0.0129 '/' Capacity=90.16 cfs Outflow=0.00 cfs 0.000 af
Reach 110: Pre-Treatment Swale	Avg. Flow Depth=0.11' Max Vel=0.90 fps Inflow=0.15 cfs 0.012 af n=0.030 L=335.5' S=0.0089 '/' Capacity=2.63 cfs Outflow=0.13 cfs 0.012 af
Reach 120: Pre-Treatment Swale	Avg. Flow Depth=0.06' Max Vel=0.59 fps Inflow=0.04 cfs 0.003 af n=0.030 L=101.2' S=0.0079 '/' Capacity=2.47 cfs Outflow=0.04 cfs 0.003 af
Reach DL-2: Design Line 2	Inflow=0.15 cfs 0.030 af Outflow=0.15 cfs 0.030 af
Reach DP-1: Design Point 1	Inflow=1.27 cfs 0.643 af Outflow=1.27 cfs 0.643 af
Pond 103: Bypass U	Peak Elev=233.62' Inflow=1.53 cfs 0.209 af Primary=1.53 cfs 0.209 af Secondary=0.00 cfs 0.000 af Outflow=1.53 cfs 0.209 af
Pond 104: Forebay	Peak Elev=233.50' Storage=2,873 cf Inflow=1.53 cfs 0.209 af Outflow=1.50 cfs 0.209 af
Pond 105: Sand Filter	Peak Elev=233.50' Storage=4,551 cf Inflow=1.50 cfs 0.209 af Discarded=0.07 cfs 0.208 af Primary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.209 af
Pond 106: Basin 1	Peak Elev=230.00' Storage=0 cf Inflow=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 112: Bio-Retention Area	Peak Elev=233.84'	Storage=447 cf	Inflow=0.26 cfs	0.031 af
	Discarded=0.03 cfs	0.031 af	Primary=0.00 cfs	0.000 af
			Outflow=0.03 cfs	0.031 af
Pond 112B: Stone Trench	Peak Elev=239.61'	Storage=0.000 af	Inflow=0.02 cfs	0.002 af
	Discarded=0.01 cfs	0.002 af	Primary=0.00 cfs	0.000 af
			Outflow=0.01 cfs	0.002 af
Pond 114: Bio-Retention Area	Peak Elev=240.27'	Storage=110 cf	Inflow=0.10 cfs	0.008 af
	Discarded=0.01 cfs	0.008 af	Primary=0.00 cfs	0.000 af
			Outflow=0.01 cfs	0.008 af
Pond 116: Stone Trench	Peak Elev=241.61'	Storage=0.000 af	Inflow=0.02 cfs	0.002 af
	Discarded=0.01 cfs	0.002 af	Primary=0.00 cfs	0.000 af
			Outflow=0.01 cfs	0.002 af
Pond 118: Bio-Retention Area	Peak Elev=245.60'	Storage=269 cf	Inflow=0.25 cfs	0.020 af
	Discarded=0.03 cfs	0.020 af	Primary=0.00 cfs	0.000 af
			Outflow=0.03 cfs	0.020 af
Pond 122: Bio-Retention Area	Peak Elev=249.59'	Storage=180 cf	Inflow=0.21 cfs	0.016 af
	Discarded=0.04 cfs	0.016 af	Primary=0.00 cfs	0.000 af
			Outflow=0.04 cfs	0.016 af
Pond 124: Bio-Retention Area	Peak Elev=254.34'	Storage=166 cf	Inflow=0.19 cfs	0.015 af
	Discarded=0.04 cfs	0.015 af	Primary=0.00 cfs	0.000 af
			Outflow=0.04 cfs	0.015 af
Pond 126: Drywell	Peak Elev=252.05'	Storage=0.000 af	Inflow=0.01 cfs	0.001 af
	Discarded=0.00 cfs	0.001 af	Primary=0.00 cfs	0.000 af
			Outflow=0.00 cfs	0.001 af
Pond 128: Bio-Retention Area	Peak Elev=257.68'	Storage=133 cf	Inflow=0.20 cfs	0.016 af
	Discarded=0.05 cfs	0.016 af	Primary=0.00 cfs	0.000 af
			Outflow=0.05 cfs	0.016 af
Pond 130: Stone Trench	Peak Elev=259.37'	Storage=0.000 af	Inflow=0.03 cfs	0.003 af
	Discarded=0.01 cfs	0.003 af	Primary=0.00 cfs	0.000 af
			Outflow=0.01 cfs	0.003 af
Pond 132: Bio-Retention Area	Peak Elev=261.99'	Storage=145 cf	Inflow=0.19 cfs	0.015 af
	Discarded=0.04 cfs	0.015 af	Primary=0.00 cfs	0.000 af
			Outflow=0.04 cfs	0.015 af
Pond 134: Stone Trench	Peak Elev=263.15'	Storage=0.001 af	Inflow=0.04 cfs	0.003 af
	Discarded=0.01 cfs	0.003 af	Primary=0.00 cfs	0.000 af
			Outflow=0.01 cfs	0.003 af
Pond 136: Drywell	Peak Elev=263.19'	Storage=0.000 af	Inflow=0.02 cfs	0.001 af
	Discarded=0.00 cfs	0.001 af	Primary=0.00 cfs	0.000 af
			Outflow=0.00 cfs	0.001 af
Pond 138: Stone Trench	Peak Elev=265.63'	Storage=0.001 af	Inflow=0.06 cfs	0.004 af
	Discarded=0.02 cfs	0.004 af	Primary=0.00 cfs	0.000 af
			Outflow=0.02 cfs	0.004 af
Pond 140: Drywell	Peak Elev=265.77'	Storage=0.000 af	Inflow=0.02 cfs	0.001 af
	Discarded=0.00 cfs	0.001 af	Primary=0.00 cfs	0.000 af
			Outflow=0.00 cfs	0.001 af
Pond 142: Drywell	Peak Elev=261.94'	Storage=0.001 af	Inflow=0.02 cfs	0.001 af
	Discarded=0.00 cfs	0.001 af	Primary=0.00 cfs	0.000 af
			Outflow=0.00 cfs	0.001 af
Pond 144: Stone Trench	Peak Elev=257.63'	Storage=0.001 af	Inflow=0.06 cfs	0.005 af
	Discarded=0.02 cfs	0.005 af	Primary=0.00 cfs	0.000 af
			Outflow=0.02 cfs	0.005 af

0161-184-ALLS-EPHCD-INHS

Type III 24-hr 1.2" WQ Storm Rainfall=1.20"

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Pond 146: Drywell

Peak Elev=259.38' Storage=0.001 af Inflow=0.02 cfs 0.002 af
Discarded=0.00 cfs 0.002 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.002 af

Total Runoff Area = 137.890 ac Runoff Volume = 1.027 af Average Runoff Depth = 0.09"
95.75% Pervious = 132.028 ac 4.25% Impervious = 5.862 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: Subcat 100 Ex

Runoff Area=128.390 ac 0.95% Impervious Runoff Depth=0.06"
Flow Length=3,830' Tc=49.9 min CN=73/98 Runoff=1.16 cfs 0.640 af

Subcatchment 200: Subcat 200 Ex

Runoff Area=9.470 ac 0.00% Impervious Runoff Depth=0.05"
Flow Length=911' Slope=0.0200 '/ Tc=27.0 min CN=73/0 Runoff=0.07 cfs 0.040 af

Reach DL-2.: Design Line 2

Inflow=0.07 cfs 0.040 af
Outflow=0.07 cfs 0.040 af

Reach DP-1.: Design Line 1

Inflow=1.16 cfs 0.640 af
Outflow=1.16 cfs 0.640 af

Total Runoff Area = 137.860 ac Runoff Volume = 0.680 af Average Runoff Depth = 0.06"
99.12% Pervious = 136.640 ac 0.88% Impervious = 1.220 ac

A3.4.1 Channel Protection (CP_v) HydroCAD 1-Year Storm Analysis

0161-184-ALLS-EPHCD-INHS

Type III 24-hr 1-Year Rainfall=2.80"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: Subcat 100 Ex

Runoff Area=128.390 ac 0.95% Impervious Runoff Depth=0.74"
Flow Length=3,830' Tc=49.9 min CN=73 Runoff=43.48 cfs 7.886 af

Subcatchment 200: Subcat 200 Ex

Runoff Area=9.470 ac 0.00% Impervious Runoff Depth=0.74"
Flow Length=911' Slope=0.0200 '/ Tc=27.0 min CN=73 Runoff=4.35 cfs 0.582 af

Reach DL-2.: Design Line 2

Inflow=4.35 cfs 0.582 af
Outflow=4.35 cfs 0.582 af

Reach DP-1.: Design Line 1

Inflow=43.48 cfs 7.886 af
Outflow=43.48 cfs 7.886 af

Total Runoff Area = 137.860 ac Runoff Volume = 8.468 af Average Runoff Depth = 0.74"
99.12% Pervious = 136.640 ac 0.88% Impervious = 1.220 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: Subcat 101 Pr	Runoff Area=118.471 ac 1.52% Impervious Runoff Depth=0.78" Flow Length=3,830' Tc=49.9 min CN=74 Runoff=43.40 cfs 7.740 af
Subcatchment 102: Subcat 102 Pr	Runoff Area=10.042 ac 22.02% Impervious Runoff Depth=0.99" Flow Length=1,646' Tc=23.9 min CN=78 Runoff=6.98 cfs 0.827 af
Subcatchment 109: L1 & L2	Runoff Area=0.212 ac 65.09% Impervious Runoff Depth=1.80" Tc=6.0 min CN=90 Runoff=0.45 cfs 0.032 af
Subcatchment 111: L1 & L2	Runoff Area=1.442 ac 12.27% Impervious Runoff Depth=0.83" Flow Length=283' Tc=16.4 min CN=75 Runoff=0.95 cfs 0.100 af
Subcatchment 112A: L1 & L2	Runoff Area=0.028 ac 75.00% Impervious Runoff Depth=1.97" Tc=6.0 min CN=92 Runoff=0.06 cfs 0.005 af
Subcatchment 113: L3	Runoff Area=0.147 ac 59.86% Impervious Runoff Depth=1.64" Tc=6.0 min CN=88 Runoff=0.28 cfs 0.020 af
Subcatchment 115: L3	Runoff Area=0.019 ac 100.00% Impervious Runoff Depth=2.57" Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af
Subcatchment 117: L4 & L5	Runoff Area=0.331 ac 58.91% Impervious Runoff Depth=1.64" Tc=6.0 min CN=88 Runoff=0.64 cfs 0.045 af
Subcatchment 119: L4 & L5	Runoff Area=0.092 ac 41.30% Impervious Runoff Depth=1.35" Tc=6.0 min CN=84 Runoff=0.15 cfs 0.010 af
Subcatchment 121: L6 & L7	Runoff Area=0.357 ac 52.94% Impervious Runoff Depth=1.57" Tc=6.0 min CN=87 Runoff=0.66 cfs 0.047 af
Subcatchment 123: L8 & L9	Runoff Area=0.318 ac 55.03% Impervious Runoff Depth=1.57" Tc=6.0 min CN=87 Runoff=0.58 cfs 0.041 af
Subcatchment 125: L8	Runoff Area=0.010 ac 100.00% Impervious Runoff Depth=2.57" Tc=6.0 min CN=98 Runoff=0.03 cfs 0.002 af
Subcatchment 127: L10 & L11	Runoff Area=0.340 ac 54.71% Impervious Runoff Depth=1.57" Tc=6.0 min CN=87 Runoff=0.62 cfs 0.044 af
Subcatchment 129: L10 & L11	Runoff Area=0.039 ac 79.49% Impervious Runoff Depth=2.06" Tc=6.0 min CN=93 Runoff=0.09 cfs 0.007 af
Subcatchment 131: L12 & L13	Runoff Area=0.297 ac 59.26% Impervious Runoff Depth=1.64" Tc=6.0 min CN=88 Runoff=0.57 cfs 0.041 af
Subcatchment 133: L12 & L13	Runoff Area=0.050 ac 78.00% Impervious Runoff Depth=2.06" Tc=6.0 min CN=93 Runoff=0.12 cfs 0.009 af

Subcatchment 135: L13	Runoff Area=0.017 ac 100.00% Impervious Runoff Depth=2.57" Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af
Subcatchment 137: L14	Runoff Area=0.054 ac 100.00% Impervious Runoff Depth=2.57" Tc=6.0 min CN=98 Runoff=0.15 cfs 0.012 af
Subcatchment 139: L14	Runoff Area=0.018 ac 100.00% Impervious Runoff Depth=2.57" Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af
Subcatchment 141: L15	Runoff Area=0.018 ac 100.00% Impervious Runoff Depth=2.57" Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af
Subcatchment 143: L16	Runoff Area=0.058 ac 100.00% Impervious Runoff Depth=2.57" Tc=6.0 min CN=98 Runoff=0.16 cfs 0.012 af
Subcatchment 145: L16	Runoff Area=0.020 ac 100.00% Impervious Runoff Depth=2.57" Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af
Subcatchment 201: Subcat 201 Pr	Runoff Area=5.510 ac 3.39% Impervious Runoff Depth=0.69" Flow Length=100' Slope=0.0300 '/ Tc=18.0 min CN=72 Runoff=2.74 cfs 0.318 af
Reach 107: Pond Discharge	Avg. Flow Depth=0.08' Max Vel=0.08 fps Inflow=0.69 cfs 0.625 af n=0.400 L=1,214.0' S=0.0229 '/ Capacity=85.73 cfs Outflow=0.36 cfs 0.622 af
Reach 108: Stream	Avg. Flow Depth=0.04' Max Vel=0.49 fps Inflow=0.36 cfs 0.622 af n=0.030 L=2,015.0' S=0.0129 '/ Capacity=90.16 cfs Outflow=0.35 cfs 0.621 af
Reach 110: Pre-Treatment Swale	Avg. Flow Depth=0.20' Max Vel=1.26 fps Inflow=0.45 cfs 0.032 af n=0.030 L=335.5' S=0.0089 '/ Capacity=2.63 cfs Outflow=0.39 cfs 0.032 af
Reach 120: Pre-Treatment Swale	Avg. Flow Depth=0.12' Max Vel=0.89 fps Inflow=0.15 cfs 0.010 af n=0.030 L=101.2' S=0.0079 '/ Capacity=2.47 cfs Outflow=0.14 cfs 0.010 af
Reach DL-2: Design Line 2	Inflow=2.74 cfs 0.318 af Outflow=2.74 cfs 0.318 af
Reach DP-1: Design Point 1	Inflow=43.78 cfs 8.420 af Outflow=43.78 cfs 8.420 af
Pond 103: Bypass U	Peak Elev=233.98' Inflow=6.98 cfs 0.827 af Primary=3.40 cfs 0.620 af Secondary=3.69 cfs 0.207 af Outflow=6.98 cfs 0.827 af
Pond 104: Forebay	Peak Elev=233.66' Storage=3,130 cf Inflow=3.40 cfs 0.620 af Outflow=3.12 cfs 0.620 af
Pond 105: Sand Filter	Peak Elev=233.65' Storage=5,044 cf Inflow=3.12 cfs 0.620 af Discarded=0.07 cfs 0.202 af Primary=2.07 cfs 0.418 af Outflow=2.14 cfs 0.620 af
Pond 106: Basin 1	Peak Elev=232.88' Storage=14,582 cf Inflow=5.19 cfs 0.625 af Primary=0.69 cfs 0.625 af Secondary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.625 af

Pond 112: Bio-Retention Area	Peak Elev=236.26'	Storage=1,916 cf	Inflow=1.24 cfs	0.132 af
	Discarded=0.03 cfs	0.076 af	Primary=0.67 cfs	0.056 af
			Outflow=0.70 cfs	0.132 af
Pond 112B: Stone Trench	Peak Elev=240.00'	Storage=0.001 af	Inflow=0.06 cfs	0.005 af
	Discarded=0.01 cfs	0.004 af	Primary=0.02 cfs	0.000 af
			Outflow=0.03 cfs	0.005 af
Pond 114: Bio-Retention Area	Peak Elev=242.65'	Storage=494 cf	Inflow=0.28 cfs	0.020 af
	Discarded=0.01 cfs	0.020 af	Primary=0.00 cfs	0.000 af
			Outflow=0.01 cfs	0.020 af
Pond 116: Stone Trench	Peak Elev=242.00'	Storage=0.001 af	Inflow=0.05 cfs	0.004 af
	Discarded=0.01 cfs	0.004 af	Primary=0.01 cfs	0.000 af
			Outflow=0.02 cfs	0.004 af
Pond 118: Bio-Retention Area	Peak Elev=247.90'	Storage=1,301 cf	Inflow=0.77 cfs	0.056 af
	Discarded=0.03 cfs	0.056 af	Primary=0.00 cfs	0.000 af
			Outflow=0.03 cfs	0.056 af
Pond 122: Bio-Retention Area	Peak Elev=251.04'	Storage=946 cf	Inflow=0.66 cfs	0.047 af
	Discarded=0.04 cfs	0.047 af	Primary=0.00 cfs	0.000 af
			Outflow=0.04 cfs	0.047 af
Pond 124: Bio-Retention Area	Peak Elev=255.68'	Storage=826 cf	Inflow=0.58 cfs	0.041 af
	Discarded=0.04 cfs	0.041 af	Primary=0.00 cfs	0.000 af
			Outflow=0.04 cfs	0.041 af
Pond 126: Drywell	Peak Elev=253.45'	Storage=0.001 af	Inflow=0.03 cfs	0.002 af
	Discarded=0.00 cfs	0.002 af	Primary=0.00 cfs	0.000 af
			Outflow=0.00 cfs	0.002 af
Pond 128: Bio-Retention Area	Peak Elev=258.51'	Storage=758 cf	Inflow=0.62 cfs	0.044 af
	Discarded=0.05 cfs	0.044 af	Primary=0.00 cfs	0.000 af
			Outflow=0.05 cfs	0.044 af
Pond 130: Stone Trench	Peak Elev=259.90'	Storage=0.002 af	Inflow=0.09 cfs	0.007 af
	Discarded=0.01 cfs	0.007 af	Primary=0.00 cfs	0.000 af
			Outflow=0.01 cfs	0.007 af
Pond 132: Bio-Retention Area	Peak Elev=262.97'	Storage=732 cf	Inflow=0.57 cfs	0.041 af
	Discarded=0.04 cfs	0.041 af	Primary=0.00 cfs	0.000 af
			Outflow=0.04 cfs	0.041 af
Pond 134: Stone Trench	Peak Elev=263.78'	Storage=0.003 af	Inflow=0.12 cfs	0.009 af
	Discarded=0.01 cfs	0.009 af	Primary=0.00 cfs	0.000 af
			Outflow=0.01 cfs	0.009 af
Pond 136: Drywell	Peak Elev=263.86'	Storage=0.001 af	Inflow=0.05 cfs	0.004 af
	Discarded=0.00 cfs	0.003 af	Primary=0.04 cfs	0.001 af
			Outflow=0.04 cfs	0.004 af
Pond 138: Stone Trench	Peak Elev=266.00'	Storage=0.003 af	Inflow=0.15 cfs	0.012 af
	Discarded=0.02 cfs	0.011 af	Primary=0.04 cfs	0.001 af
			Outflow=0.06 cfs	0.012 af
Pond 140: Drywell	Peak Elev=266.10'	Storage=0.001 af	Inflow=0.05 cfs	0.004 af
	Discarded=0.00 cfs	0.003 af	Primary=0.03 cfs	0.001 af
			Outflow=0.03 cfs	0.004 af
Pond 142: Drywell	Peak Elev=263.09'	Storage=0.001 af	Inflow=0.05 cfs	0.004 af
	Discarded=0.00 cfs	0.003 af	Primary=0.02 cfs	0.001 af
			Outflow=0.02 cfs	0.004 af
Pond 144: Stone Trench	Peak Elev=258.00'	Storage=0.003 af	Inflow=0.16 cfs	0.012 af
	Discarded=0.02 cfs	0.012 af	Primary=0.04 cfs	0.001 af
			Outflow=0.06 cfs	0.012 af

0161-184-ALLS-EPHCD-INHS

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Type III 24-hr 1-Year Rainfall=2.80"

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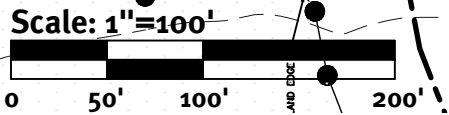
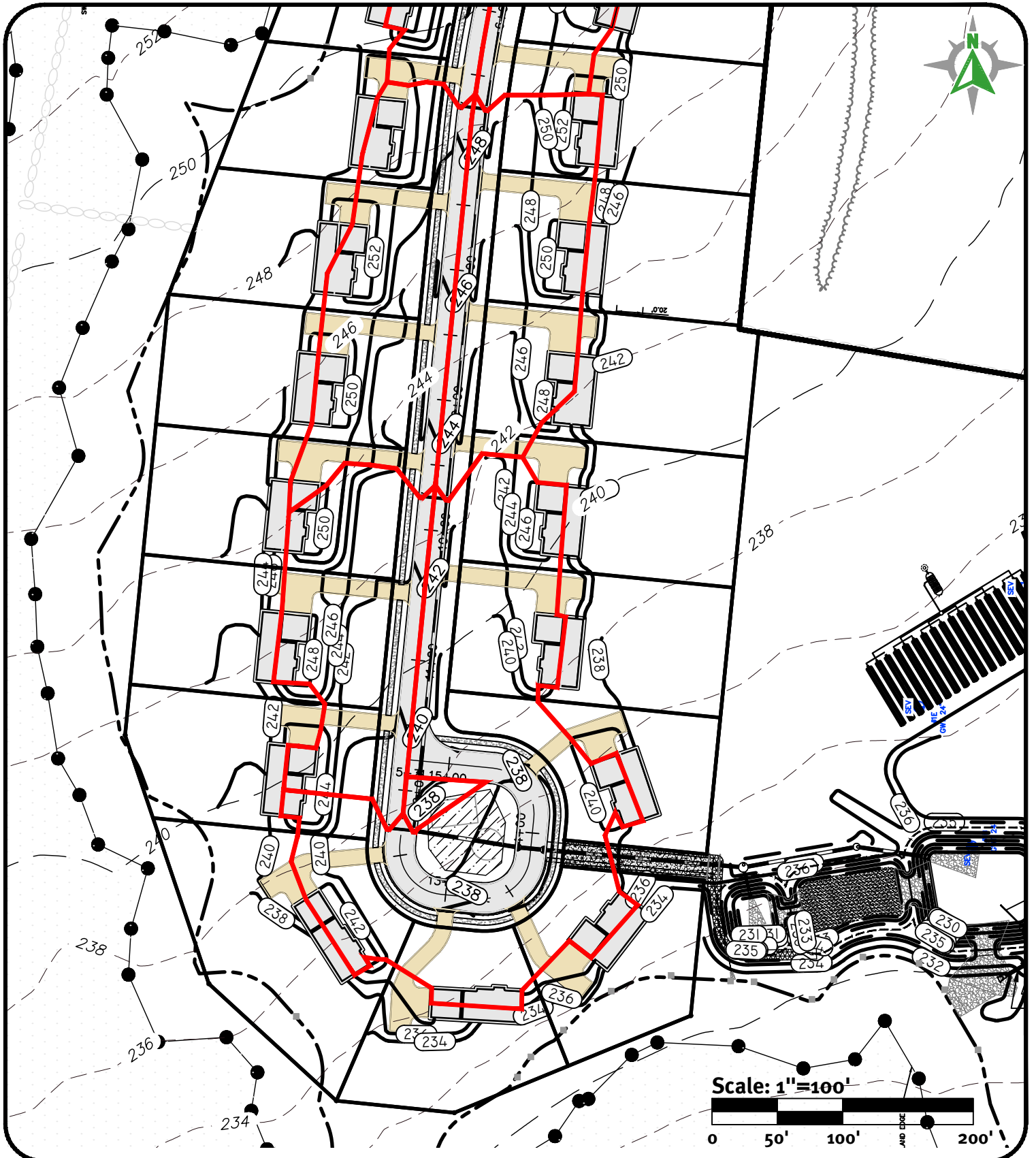
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Pond 146: Drywell

Peak Elev=261.50' Storage=0.003 af Inflow=0.05 cfs 0.004 af
Discarded=0.00 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.004 af

Total Runoff Area = 137.890 ac Runoff Volume = 9.331 af Average Runoff Depth = 0.81"
95.75% Pervious = 132.028 ac 4.25% Impervious = 5.862 ac

A3.4.2 Drainage Network Hydraulic Calculations



SHEET
2
 OF 2

PAISLEY WAY PIPES - 2
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 SOUTH KINGSTOWN, RHODE ISLAND

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Pipes

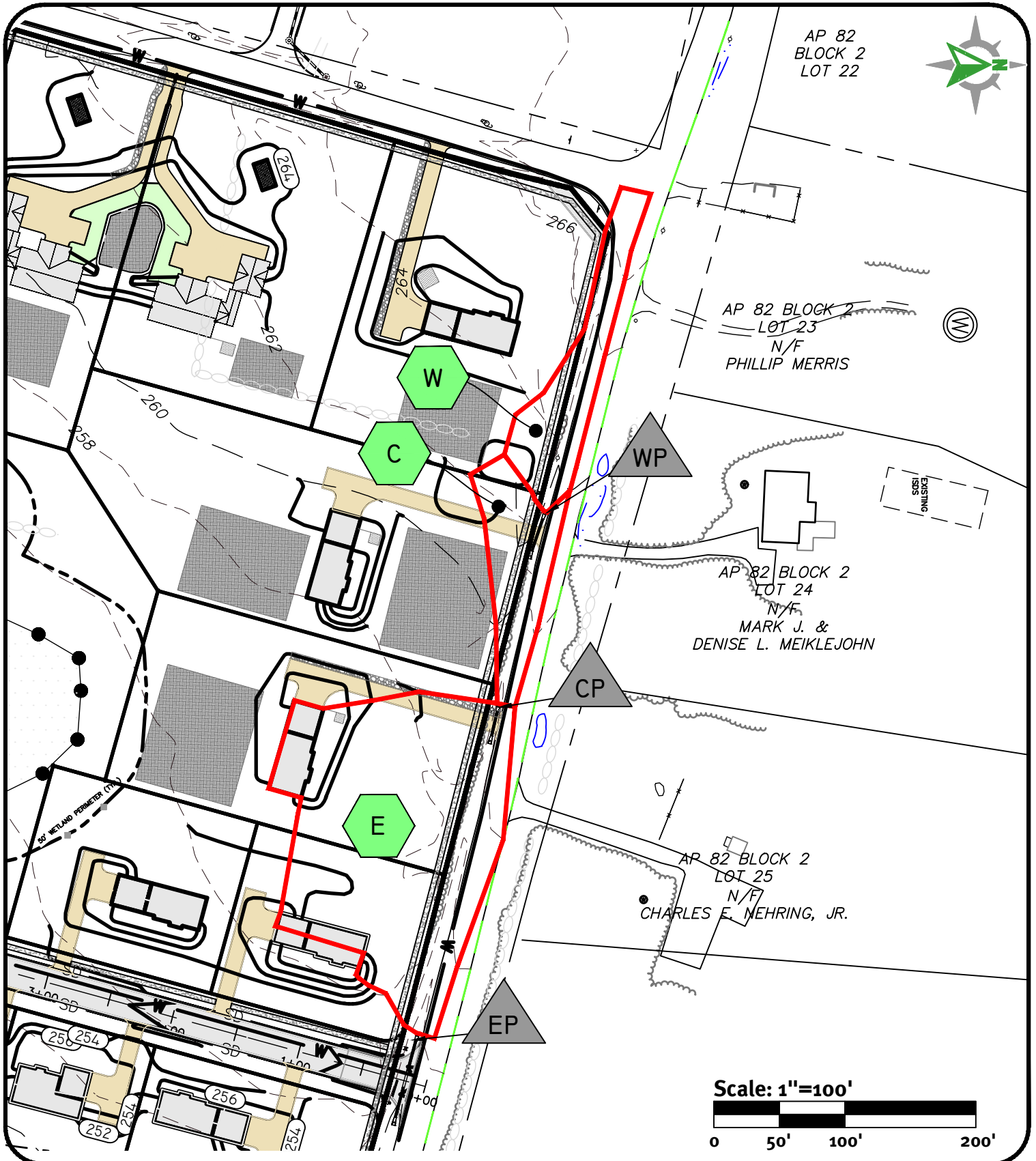
Line No.	Line ID	Line Length (ft)	Line Size (in)	Line Slope (%)	Flow Rate (cfs)	Capac Full (cfs)	Cover Dn (ft)	Cover Up (ft)	Invert Dn (ft)	Invert Up (ft)	Vel Ave (ft/s)	HGL Dn (ft)	HGL Up (ft)	Rim-Hw (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Known Q (cfs)
1	DMH2-FE1	9.738	6	0.92	19.18	0.58	0.25	2.79	232.41	232.50	97.69	235.40	332.57	-224.37	233.16	235.79	0.00
2	CB10-DMH2	153.231	24	0.50	19.38	17.37	0.79	1.75	233.00	233.77	6.17	460.16	461.12	-223.89	235.79	237.52	0.00	9.83	6.32	0.00
3	CB9-CB10	20.000	24	0.50	16.91	0.00	1.75	1.65	233.77	233.87	0.00	0.00	0.00	237.52	237.52	237.52	0.00	3.64	0.13	0.00
4	CB8-CB9	80.142	24	0.50	14.52	0.00	1.65	2.70	233.87	234.27	0.00	0.00	0.00	238.97	237.52	238.97	0.13	0.03	0.00	0.00
5	CB6-CB8	255.000	24	1.00	12.73	0.00	2.70	4.13	234.27	236.82	0.00	0.00	0.00	242.95	238.97	242.95	2.85	2.26	2.01	0.00
6	CB4-CB6	299.749	18	2.19	8.13	0.00	4.13	3.02	237.32	243.87	0.00	0.00	0.00	248.39	242.95	248.39	2.01	1.86	0.88	0.00
7	DMH1-CB4	94.067	15	1.24	3.68	0.00	3.02	3.31	244.12	245.29	0.00	0.00	0.00	249.85	248.39	249.85	0.00
8	CB2-DMH1	204.534	15	1.25	3.82	0.00	3.31	3.03	245.29	247.85	0.00	0.00	0.00	252.13	249.85	252.13	0.88	1.11	0.00	0.00
9	CB1-CB2	20.000	15	1.00	1.86	0.00	3.03	2.83	247.85	248.05	0.00	0.00	0.00	252.13	252.13	252.13	0.80	1.06	0.00	0.00
10	CB3-CB4	20.000	15	1.00	2.97	0.00	3.02	2.82	244.12	244.32	0.00	0.00	0.00	248.39	248.39	248.39	1.94	1.83	0.80	0.00
11	CB5-CB6	20.000	15	1.00	3.46	0.00	4.13	3.93	237.57	237.77	0.00	0.00	0.00	242.95	242.95	242.95	3.05	2.35	1.94	0.00
12	CB7-CB8	20.000	15	1.00	2.80	0.00	2.70	2.50	235.02	235.22	0.00	0.00	0.00	238.97	238.97	238.97	3.47	2.39	3.05	0.00

Project File: 0161-184-ALLS-HFLO-INHS.stm

Number of lines: 12

Date: 9/7/2023

NOTES: ** Critical depth



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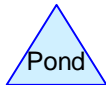
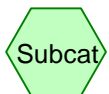
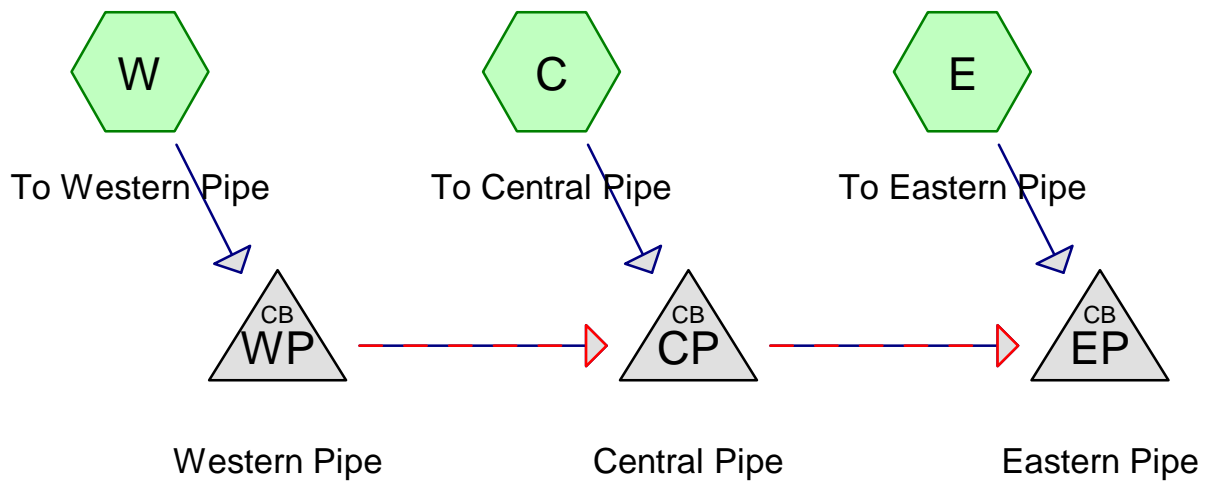
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Routing Diagram for 0161-184-ALLS-EPHCD-INHS Roadway Pipes
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0161-184-ALLS-EPHCD-INHS Roadway Pipes

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.789	86	<50% Grass cover, Poor, HSG C (C, E, W)
0.330	98	Pavement (C, E, W)
1.119	90	TOTAL AREA

0161-184-ALLS-EPHCD-INHS Roadway Pipes

Type III 24-hr 100-Year Rainfall=8.50"

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s 25 h

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment C: To Central Pipe Runoff Area=7,109 sf 32.49% Impervious Runoff Depth=7.30"
Tc=6.0 min CN=90 Runoff=1.30 cfs 0.099 af

Subcatchment E: To Eastern Pipe Runoff Area=33,773 sf 24.74% Impervious Runoff Depth=7.18"
Tc=6.0 min CN=89 Runoff=6.12 cfs 0.464 af

Subcatchment W: To Western Pipe Runoff Area=7,880 sf 47.14% Impervious Runoff Depth=7.54"
Tc=6.0 min CN=92 Runoff=1.47 cfs 0.114 af

Pond CP: Central Pipe Peak Elev=256.41' Inflow=2.77 cfs 0.213 af
Primary=2.77 cfs 0.213 af Secondary=0.00 cfs 0.000 af Outflow=2.77 cfs 0.213 af

Pond EP: Eastern Pipe Peak Elev=252.61' Inflow=8.88 cfs 0.677 af
Primary=7.35 cfs 0.668 af Secondary=1.54 cfs 0.009 af Outflow=8.88 cfs 0.677 af

Pond WP: Western Pipe Peak Elev=259.63' Inflow=1.47 cfs 0.114 af
Primary=1.47 cfs 0.114 af Secondary=0.00 cfs 0.000 af Outflow=1.47 cfs 0.114 af

0161-184-ALLS-EPHCD-INHS Roadway Pipes

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Type III 24-hr 100-Year Rainfall=8.50"
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Summary for Subcatchment C: To Central Pipe

Runoff = 1.30 cfs @ 12.08 hrs, Volume= 0.099 af, Depth= 7.30"
 Routed to Pond CP : Central Pipe

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

	Area (sf)	CN	Description
*	2,310	98	Pavement
	4,799	86	<50% Grass cover, Poor, HSG C
	7,109	90	Weighted Average
	4,799	86	67.51% Pervious Area
	2,310	98	32.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment E: To Eastern Pipe

Runoff = 6.12 cfs @ 12.08 hrs, Volume= 0.464 af, Depth= 7.18"
 Routed to Pond EP : Eastern Pipe

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

	Area (sf)	CN	Description
*	8,356	98	Pavement
	25,417	86	<50% Grass cover, Poor, HSG C
	33,773	89	Weighted Average
	25,417	86	75.26% Pervious Area
	8,356	98	24.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment W: To Western Pipe

Runoff = 1.47 cfs @ 12.08 hrs, Volume= 0.114 af, Depth= 7.54"
 Routed to Pond WP : Western Pipe

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

0161-184-ALLS-EPHCD-INHS Roadway Pipes

Type III 24-hr 100-Year Rainfall=8.50"

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Area (sf)	CN	Description
3,715	98	Pavement
4,165	86	<50% Grass cover, Poor, HSG C
7,880	92	Weighted Average
4,165	86	52.86% Pervious Area
3,715	98	47.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Pond CP: Central Pipe

Inflow Area = 0.344 ac, 40.20% Impervious, Inflow Depth = 7.42" for 100-Year event
 Inflow = 2.77 cfs @ 12.08 hrs, Volume= 0.213 af
 Outflow = 2.77 cfs @ 12.08 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.77 cfs @ 12.08 hrs, Volume= 0.213 af
 Routed to Pond EP : Eastern Pipe
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond EP : Eastern Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 256.41' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	255.50'	15.0" Round Culvert L= 19.1' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 255.50' / 255.00' S= 0.0262 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	258.00'	12.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.76 cfs @ 12.08 hrs HW=256.41' TW=252.61' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 2.76 cfs @ 2.87 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=255.50' TW=250.00' (Dynamic Tailwater)
 ↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond EP: Eastern Pipe

Inflow Area = 1.119 ac, 29.49% Impervious, Inflow Depth = 7.25" for 100-Year event
 Inflow = 8.88 cfs @ 12.08 hrs, Volume= 0.677 af
 Outflow = 8.88 cfs @ 12.08 hrs, Volume= 0.677 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.35 cfs @ 12.08 hrs, Volume= 0.668 af
 Secondary = 1.54 cfs @ 12.08 hrs, Volume= 0.009 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

0161-184-ALLS-EPHCD-INHS Roadway Pipes

Type III 24-hr 100-Year Rainfall=8.50"

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Peak Elev= 252.61' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	250.00'	15.0" Round Culvert L= 60.3' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 250.00' / 249.50' S= 0.0083 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	252.50'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=7.34 cfs @ 12.08 hrs HW=252.61' (Free Discharge)

↑**1=Culvert** (Inlet Controls 7.34 cfs @ 5.99 fps)

Secondary OutFlow Max=1.52 cfs @ 12.08 hrs HW=252.61' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.52 cfs @ 0.93 fps)

Summary for Pond WP: Western Pipe

Inflow Area = 0.181 ac, 47.14% Impervious, Inflow Depth = 7.54" for 100-Year event
 Inflow = 1.47 cfs @ 12.08 hrs, Volume= 0.114 af
 Outflow = 1.47 cfs @ 12.08 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.47 cfs @ 12.08 hrs, Volume= 0.114 af
 Routed to Pond CP : Central Pipe
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond CP : Central Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 259.63' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	259.00'	15.0" Round Culvert L= 24.6' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 259.00' / 258.20' S= 0.0325 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	261.50'	12.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=1.46 cfs @ 12.08 hrs HW=259.63' TW=256.41' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 1.46 cfs @ 2.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=259.00' TW=255.50' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

A3.5.4.2 HydroCAD 10-Year Storm Analysis

0161-184-ALLS-EPHCD-INHS

Type III 24-hr 10-Year Rainfall=4.90"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: Subcat 100 Ex

Runoff Area=128.390 ac 0.95% Impervious Runoff Depth=2.20"
Flow Length=3,830' Tc=49.9 min CN=73 Runoff=143.75 cfs 23.563 af

Subcatchment 200: Subcat 200 Ex

Runoff Area=9.470 ac 0.00% Impervious Runoff Depth=2.20"
Flow Length=911' Slope=0.0200 '/' Tc=27.0 min CN=73 Runoff=14.35 cfs 1.738 af

Reach DL-2.: Design Line 2

Inflow=14.35 cfs 1.738 af
Outflow=14.35 cfs 1.738 af

Reach DP-1.: Design Line 1

Inflow=143.75 cfs 23.563 af
Outflow=143.75 cfs 23.563 af

Total Runoff Area = 137.860 ac Runoff Volume = 25.301 af Average Runoff Depth = 2.20"
99.12% Pervious = 136.640 ac 0.88% Impervious = 1.220 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: Subcat 101 Pr	Runoff Area=118.471 ac 1.52% Impervious Runoff Depth=2.28" Flow Length=3,830' Tc=49.9 min CN=74 Runoff=138.06 cfs 22.556 af
Subcatchment 102: Subcat 102 Pr	Runoff Area=10.042 ac 22.02% Impervious Runoff Depth=2.63" Flow Length=1,646' Tc=23.9 min CN=78 Runoff=19.31 cfs 2.198 af
Subcatchment 109: L1 & L2	Runoff Area=0.212 ac 65.09% Impervious Runoff Depth=3.78" Tc=6.0 min CN=90 Runoff=0.91 cfs 0.067 af
Subcatchment 111: L1 & L2	Runoff Area=1.442 ac 12.27% Impervious Runoff Depth=2.37" Flow Length=283' Tc=16.4 min CN=75 Runoff=2.91 cfs 0.285 af
Subcatchment 112A: L1 & L2	Runoff Area=0.028 ac 75.00% Impervious Runoff Depth=3.99" Tc=6.0 min CN=92 Runoff=0.12 cfs 0.009 af
Subcatchment 113: L3	Runoff Area=0.147 ac 59.86% Impervious Runoff Depth=3.57" Tc=6.0 min CN=88 Runoff=0.60 cfs 0.044 af
Subcatchment 115: L3	Runoff Area=0.019 ac 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.09 cfs 0.007 af
Subcatchment 117: L4 & L5	Runoff Area=0.331 ac 58.91% Impervious Runoff Depth=3.57" Tc=6.0 min CN=88 Runoff=1.36 cfs 0.099 af
Subcatchment 119: L4 & L5	Runoff Area=0.092 ac 41.30% Impervious Runoff Depth=3.18" Tc=6.0 min CN=84 Runoff=0.34 cfs 0.024 af
Subcatchment 121: L6 & L7	Runoff Area=0.357 ac 52.94% Impervious Runoff Depth=3.47" Tc=6.0 min CN=87 Runoff=1.43 cfs 0.103 af
Subcatchment 123: L8 & L9	Runoff Area=0.318 ac 55.03% Impervious Runoff Depth=3.47" Tc=6.0 min CN=87 Runoff=1.27 cfs 0.092 af
Subcatchment 125: L8	Runoff Area=0.010 ac 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af
Subcatchment 127: L10 & L11	Runoff Area=0.340 ac 54.71% Impervious Runoff Depth=3.47" Tc=6.0 min CN=87 Runoff=1.36 cfs 0.098 af
Subcatchment 129: L10 & L11	Runoff Area=0.039 ac 79.49% Impervious Runoff Depth=4.10" Tc=6.0 min CN=93 Runoff=0.18 cfs 0.013 af
Subcatchment 131: L12 & L13	Runoff Area=0.297 ac 59.26% Impervious Runoff Depth=3.57" Tc=6.0 min CN=88 Runoff=1.22 cfs 0.088 af
Subcatchment 133: L12 & L13	Runoff Area=0.050 ac 78.00% Impervious Runoff Depth=4.10" Tc=6.0 min CN=93 Runoff=0.23 cfs 0.017 af

Subcatchment 135: L13	Runoff Area=0.017 ac 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.08 cfs 0.007 af
Subcatchment 137: L14	Runoff Area=0.054 ac 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.26 cfs 0.021 af
Subcatchment 139: L14	Runoff Area=0.018 ac 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.09 cfs 0.007 af
Subcatchment 141: L15	Runoff Area=0.018 ac 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.09 cfs 0.007 af
Subcatchment 143: L16	Runoff Area=0.058 ac 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.28 cfs 0.023 af
Subcatchment 145: L16	Runoff Area=0.020 ac 100.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=98 Runoff=0.10 cfs 0.008 af
Subcatchment 201: Subcat 201 Pr	Runoff Area=5.510 ac 3.39% Impervious Runoff Depth=2.12" Flow Length=100' Slope=0.0300 '/ Tc=18.0 min CN=72 Runoff=9.51 cfs 0.974 af
Reach 107: Pond Discharge	Avg. Flow Depth=0.23' Max Vel=0.16 fps Inflow=17.42 cfs 1.983 af n=0.400 L=1,214.0' S=0.0229 '/ Capacity=85.73 cfs Outflow=3.55 cfs 1.979 af
Reach 108: Stream	Avg. Flow Depth=0.11' Max Vel=0.97 fps Inflow=3.55 cfs 1.979 af n=0.030 L=2,015.0' S=0.0129 '/ Capacity=90.16 cfs Outflow=3.20 cfs 1.977 af
Reach 110: Pre-Treatment Swale	Avg. Flow Depth=0.29' Max Vel=1.54 fps Inflow=0.91 cfs 0.067 af n=0.030 L=335.5' S=0.0089 '/ Capacity=2.63 cfs Outflow=0.82 cfs 0.067 af
Reach 120: Pre-Treatment Swale	Avg. Flow Depth=0.19' Max Vel=1.15 fps Inflow=0.34 cfs 0.024 af n=0.030 L=101.2' S=0.0079 '/ Capacity=2.47 cfs Outflow=0.33 cfs 0.024 af
Reach DL-2: Design Line 2	Inflow=9.51 cfs 0.974 af Outflow=9.51 cfs 0.974 af
Reach DP-1: Design Point 1	Inflow=139.80 cfs 24.886 af Outflow=139.80 cfs 24.886 af
Pond 103: Bypass U	Peak Elev=234.48' Inflow=19.31 cfs 2.198 af Primary=4.92 cfs 1.225 af Secondary=14.40 cfs 0.973 af Outflow=19.31 cfs 2.198 af
Pond 104: Forebay	Peak Elev=233.79' Storage=3,365 cf Inflow=4.92 cfs 1.225 af Outflow=4.87 cfs 1.225 af
Pond 105: Sand Filter	Peak Elev=233.76' Storage=5,425 cf Inflow=4.87 cfs 1.225 af Discarded=0.07 cfs 0.216 af Primary=4.78 cfs 1.009 af Outflow=4.85 cfs 1.225 af
Pond 106: Basin 1	Peak Elev=233.55' Storage=19,014 cf Inflow=19.14 cfs 1.983 af Primary=6.13 cfs 1.450 af Secondary=11.29 cfs 0.532 af Outflow=17.42 cfs 1.983 af

Pond 112: Bio-Retention Area	Peak Elev=236.37'	Storage=2,086 cf	Inflow=3.51 cfs	0.351 af
	Discarded=0.03 cfs	0.082 af	Primary=3.47 cfs	0.270 af
			Outflow=3.50 cfs	0.351 af
Pond 112B: Stone Trench	Peak Elev=240.01'	Storage=0.001 af	Inflow=0.12 cfs	0.009 af
	Discarded=0.01 cfs	0.007 af	Primary=0.12 cfs	0.003 af
			Outflow=0.12 cfs	0.009 af
Pond 114: Bio-Retention Area	Peak Elev=243.18'	Storage=742 cf	Inflow=0.60 cfs	0.044 af
	Discarded=0.01 cfs	0.030 af	Primary=0.30 cfs	0.014 af
			Outflow=0.31 cfs	0.044 af
Pond 116: Stone Trench	Peak Elev=242.01'	Storage=0.001 af	Inflow=0.09 cfs	0.007 af
	Discarded=0.01 cfs	0.006 af	Primary=0.08 cfs	0.002 af
			Outflow=0.09 cfs	0.007 af
Pond 118: Bio-Retention Area	Peak Elev=248.65'	Storage=2,325 cf	Inflow=1.68 cfs	0.123 af
	Discarded=0.03 cfs	0.090 af	Primary=0.54 cfs	0.033 af
			Outflow=0.58 cfs	0.123 af
Pond 122: Bio-Retention Area	Peak Elev=252.90'	Storage=2,731 cf	Inflow=1.43 cfs	0.103 af
	Discarded=0.04 cfs	0.102 af	Primary=0.02 cfs	0.001 af
			Outflow=0.06 cfs	0.103 af
Pond 124: Bio-Retention Area	Peak Elev=257.59'	Storage=2,441 cf	Inflow=1.27 cfs	0.092 af
	Discarded=0.04 cfs	0.092 af	Primary=0.00 cfs	0.000 af
			Outflow=0.04 cfs	0.092 af
Pond 126: Drywell	Peak Elev=253.62'	Storage=0.001 af	Inflow=0.05 cfs	0.004 af
	Discarded=0.00 cfs	0.003 af	Primary=0.04 cfs	0.001 af
			Outflow=0.04 cfs	0.004 af
Pond 128: Bio-Retention Area	Peak Elev=260.52'	Storage=2,288 cf	Inflow=1.36 cfs	0.098 af
	Discarded=0.05 cfs	0.098 af	Primary=0.00 cfs	0.000 af
			Outflow=0.05 cfs	0.098 af
Pond 130: Stone Trench	Peak Elev=260.01'	Storage=0.003 af	Inflow=0.18 cfs	0.013 af
	Discarded=0.01 cfs	0.010 af	Primary=0.16 cfs	0.003 af
			Outflow=0.17 cfs	0.013 af
Pond 132: Bio-Retention Area	Peak Elev=264.93'	Storage=2,142 cf	Inflow=1.22 cfs	0.088 af
	Discarded=0.04 cfs	0.088 af	Primary=0.00 cfs	0.000 af
			Outflow=0.04 cfs	0.088 af
Pond 134: Stone Trench	Peak Elev=264.01'	Storage=0.004 af	Inflow=0.23 cfs	0.017 af
	Discarded=0.01 cfs	0.013 af	Primary=0.19 cfs	0.004 af
			Outflow=0.20 cfs	0.017 af
Pond 136: Drywell	Peak Elev=263.92'	Storage=0.001 af	Inflow=0.08 cfs	0.007 af
	Discarded=0.00 cfs	0.004 af	Primary=0.08 cfs	0.003 af
			Outflow=0.08 cfs	0.007 af
Pond 138: Stone Trench	Peak Elev=266.01'	Storage=0.003 af	Inflow=0.26 cfs	0.021 af
	Discarded=0.02 cfs	0.016 af	Primary=0.24 cfs	0.005 af
			Outflow=0.26 cfs	0.021 af
Pond 140: Drywell	Peak Elev=266.17'	Storage=0.001 af	Inflow=0.09 cfs	0.007 af
	Discarded=0.00 cfs	0.005 af	Primary=0.08 cfs	0.002 af
			Outflow=0.09 cfs	0.007 af
Pond 142: Drywell	Peak Elev=263.17'	Storage=0.001 af	Inflow=0.09 cfs	0.007 af
	Discarded=0.00 cfs	0.004 af	Primary=0.08 cfs	0.003 af
			Outflow=0.09 cfs	0.007 af
Pond 144: Stone Trench	Peak Elev=258.01'	Storage=0.003 af	Inflow=0.28 cfs	0.023 af
	Discarded=0.02 cfs	0.017 af	Primary=0.26 cfs	0.005 af
			Outflow=0.28 cfs	0.023 af

0161-184-ALLS-EPHCD-INHS

Prepared by DiPrete Engineering

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Type III 24-hr 10-Year Rainfall=4.90"

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Pond 146: Drywell

Peak Elev=262.15' Storage=0.003 af Inflow=0.10 cfs 0.008 af
Discarded=0.00 cfs 0.005 af Primary=0.07 cfs 0.003 af Outflow=0.07 cfs 0.008 af

Total Runoff Area = 137.890 ac Runoff Volume = 26.752 af Average Runoff Depth = 2.33"
95.75% Pervious = 132.028 ac 4.25% Impervious = 5.862 ac

A3.5.4.3 HydroCAD 100-Year Storm Analysis

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: Subcat 100 Ex Runoff Area=128.390 ac 0.95% Impervious Runoff Depth=5.26"
Flow Length=3,830' Tc=49.9 min CN=73 Runoff=346.56 cfs 56.229 af

Subcatchment 200: Subcat 200 Ex Runoff Area=9.470 ac 0.00% Impervious Runoff Depth=5.26"
Flow Length=911' Slope=0.0200 '/' Tc=27.0 min CN=73 Runoff=34.51 cfs 4.147 af

Reach DL-2.: Design Line 2 Inflow=34.51 cfs 4.147 af
Outflow=34.51 cfs 4.147 af

Reach DP-1.: Design Line 1 Inflow=346.56 cfs 56.229 af
Outflow=346.56 cfs 56.229 af

Total Runoff Area = 137.860 ac Runoff Volume = 60.377 af Average Runoff Depth = 5.26"
99.12% Pervious = 136.640 ac 0.88% Impervious = 1.220 ac

Summary for Subcatchment 100: Subcat 100 Ex

Runoff = 346.56 cfs @ 12.69 hrs, Volume= 56.229 af, Depth= 5.26"
 Routed to Reach DP-1. : Design Line 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 1.220	98	Impervious
0.190	80	>75% Grass cover, Good, HSG D
13.180	74	>75% Grass cover, Good, HSG C
70.360	70	Woods, Good, HSG C
43.440	77	Woods, Good, HSG D
128.390	73	Weighted Average
127.170	73	99.05% Pervious Area
1.220	98	0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.1	100	0.0200	0.08		Sheet Flow, 1A - 1B
					Woods: Light underbrush n= 0.400 P2= 3.30"
28.8	3,730	0.0180	2.16		Shallow Concentrated Flow, 1B-1C
					Unpaved Kv= 16.1 fps
49.9	3,830	Total			

Summary for Subcatchment 200: Subcat 200 Ex

Runoff = 34.51 cfs @ 12.38 hrs, Volume= 4.147 af, Depth= 5.26"
 Routed to Reach DL-2. : Design Line 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
0.959	74	>75% Grass cover, Good, HSG C
0.039	70	Woods, Good, HSG C
5.165	74	>75% Grass cover, Good, HSG C
3.307	70	Woods, Good, HSG C
9.470	73	Weighted Average
9.470	73	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.1	100	0.0200	0.08		Sheet Flow, 2A - 2B
					Woods: Light underbrush n= 0.400 P2= 3.30"
5.9	811	0.0200	2.28		Shallow Concentrated Flow, 2B - 2C
					Unpaved Kv= 16.1 fps
27.0	911	Total			

Summary for Reach DL-2.: Design Line 2

Inflow Area = 9.470 ac, 0.00% Impervious, Inflow Depth = 5.26" for 100-Year event
 Inflow = 34.51 cfs @ 12.38 hrs, Volume= 4.147 af
 Outflow = 34.51 cfs @ 12.38 hrs, Volume= 4.147 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-1.: Design Line 1

Inflow Area = 128.390 ac, 0.95% Impervious, Inflow Depth = 5.26" for 100-Year event
 Inflow = 346.56 cfs @ 12.69 hrs, Volume= 56.229 af
 Outflow = 346.56 cfs @ 12.69 hrs, Volume= 56.229 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: Subcat 101 Pr	Runoff Area=118.471 ac 1.52% Impervious Runoff Depth=5.38" Flow Length=3,830' Tc=49.9 min CN=74 Runoff=326.74 cfs 53.067 af
Subcatchment 102: Subcat 102 Pr	Runoff Area=10.042 ac 22.02% Impervious Runoff Depth=5.85" Flow Length=1,646' Tc=23.9 min CN=78 Runoff=42.68 cfs 4.900 af
Subcatchment 109: L1 & L2	Runoff Area=0.212 ac 65.09% Impervious Runoff Depth=7.30" Tc=6.0 min CN=90 Runoff=1.69 cfs 0.129 af
Subcatchment 111: L1 & L2	Runoff Area=1.442 ac 12.27% Impervious Runoff Depth=5.50" Flow Length=283' Tc=16.4 min CN=75 Runoff=6.77 cfs 0.660 af
Subcatchment 112A: L1 & L2	Runoff Area=0.028 ac 75.00% Impervious Runoff Depth=7.54" Tc=6.0 min CN=92 Runoff=0.23 cfs 0.018 af
Subcatchment 113: L3	Runoff Area=0.147 ac 59.86% Impervious Runoff Depth=7.06" Tc=6.0 min CN=88 Runoff=1.15 cfs 0.086 af
Subcatchment 115: L3	Runoff Area=0.019 ac 100.00% Impervious Runoff Depth=8.26" Tc=6.0 min CN=98 Runoff=0.16 cfs 0.013 af
Subcatchment 117: L4 & L5	Runoff Area=0.331 ac 58.91% Impervious Runoff Depth=7.06" Tc=6.0 min CN=88 Runoff=2.59 cfs 0.195 af
Subcatchment 119: L4 & L5	Runoff Area=0.092 ac 41.30% Impervious Runoff Depth=6.58" Tc=6.0 min CN=84 Runoff=0.68 cfs 0.050 af
Subcatchment 121: L6 & L7	Runoff Area=0.357 ac 52.94% Impervious Runoff Depth=6.94" Tc=6.0 min CN=87 Runoff=2.76 cfs 0.206 af
Subcatchment 123: L8 & L9	Runoff Area=0.318 ac 55.03% Impervious Runoff Depth=6.94" Tc=6.0 min CN=87 Runoff=2.46 cfs 0.184 af
Subcatchment 125: L8	Runoff Area=0.010 ac 100.00% Impervious Runoff Depth=8.26" Tc=6.0 min CN=98 Runoff=0.08 cfs 0.007 af
Subcatchment 127: L10 & L11	Runoff Area=0.340 ac 54.71% Impervious Runoff Depth=6.94" Tc=6.0 min CN=87 Runoff=2.63 cfs 0.197 af
Subcatchment 129: L10 & L11	Runoff Area=0.039 ac 79.49% Impervious Runoff Depth=7.66" Tc=6.0 min CN=93 Runoff=0.32 cfs 0.025 af
Subcatchment 131: L12 & L13	Runoff Area=0.297 ac 59.26% Impervious Runoff Depth=7.06" Tc=6.0 min CN=88 Runoff=2.32 cfs 0.175 af
Subcatchment 133: L12 & L13	Runoff Area=0.050 ac 78.00% Impervious Runoff Depth=7.66" Tc=6.0 min CN=93 Runoff=0.41 cfs 0.032 af

0161-184-ALLS-EPHCD-INHS

Type III 24-hr 100-Year Rainfall=8.50"

Prepared by DiPrete Engineering

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Subcatchment 135: L13	Runoff Area=0.017 ac 100.00% Impervious Runoff Depth=8.26" Tc=6.0 min CN=98 Runoff=0.14 cfs 0.012 af
Subcatchment 137: L14	Runoff Area=0.054 ac 100.00% Impervious Runoff Depth=8.26" Tc=6.0 min CN=98 Runoff=0.45 cfs 0.037 af
Subcatchment 139: L14	Runoff Area=0.018 ac 100.00% Impervious Runoff Depth=8.26" Tc=6.0 min CN=98 Runoff=0.15 cfs 0.012 af
Subcatchment 141: L15	Runoff Area=0.018 ac 100.00% Impervious Runoff Depth=8.26" Tc=6.0 min CN=98 Runoff=0.15 cfs 0.012 af
Subcatchment 143: L16	Runoff Area=0.058 ac 100.00% Impervious Runoff Depth=8.26" Tc=6.0 min CN=98 Runoff=0.48 cfs 0.040 af
Subcatchment 145: L16	Runoff Area=0.020 ac 100.00% Impervious Runoff Depth=8.26" Tc=6.0 min CN=98 Runoff=0.17 cfs 0.014 af
Subcatchment 201: Subcat 201 Pr	Runoff Area=5.510 ac 3.39% Impervious Runoff Depth=5.14" Flow Length=100' Slope=0.0300 '/' Tc=18.0 min CN=72 Runoff=23.33 cfs 2.358 af
Reach 107: Pond Discharge	Avg. Flow Depth=0.45' Max Vel=0.25 fps Inflow=40.96 cfs 4.669 af n=0.400 L=1,214.0' S=0.0229 '/' Capacity=85.73 cfs Outflow=15.08 cfs 4.665 af
Reach 108: Stream	Avg. Flow Depth=0.21' Max Vel=1.51 fps Inflow=15.08 cfs 4.665 af n=0.030 L=2,015.0' S=0.0129 '/' Capacity=90.16 cfs Outflow=13.47 cfs 4.664 af
Reach 110: Pre-Treatment Swale	Avg. Flow Depth=0.39' Max Vel=1.83 fps Inflow=1.69 cfs 0.129 af n=0.030 L=335.5' S=0.0089 '/' Capacity=2.63 cfs Outflow=1.56 cfs 0.129 af
Reach 120: Pre-Treatment Swale	Avg. Flow Depth=0.27' Max Vel=1.40 fps Inflow=0.68 cfs 0.050 af n=0.030 L=101.2' S=0.0079 '/' Capacity=2.47 cfs Outflow=0.67 cfs 0.050 af
Reach DL-2: Design Line 2	Inflow=23.33 cfs 2.358 af Outflow=23.33 cfs 2.358 af
Reach DP-1: Design Point 1	Inflow=338.28 cfs 58.984 af Outflow=338.28 cfs 58.984 af
Pond 103: Bypass U	Peak Elev=238.13' Inflow=42.68 cfs 4.900 af Primary=11.79 cfs 2.198 af Secondary=30.89 cfs 2.702 af Outflow=42.68 cfs 4.900 af
Pond 104: Forebay	Peak Elev=234.19' Storage=4,110 cf Inflow=11.79 cfs 2.198 af Outflow=11.41 cfs 2.198 af
Pond 105: Sand Filter	Peak Elev=234.10' Storage=6,675 cf Inflow=11.41 cfs 2.198 af Discarded=0.07 cfs 0.230 af Primary=11.15 cfs 1.968 af Outflow=11.22 cfs 2.198 af
Pond 106: Basin 1	Peak Elev=233.99' Storage=22,112 cf Inflow=41.47 cfs 4.669 af Primary=11.47 cfs 2.546 af Secondary=29.50 cfs 2.124 af Outflow=40.96 cfs 4.669 af

Pond 112: Bio-Retention Area	Peak Elev=236.49'	Storage=2,270 cf	Inflow=7.87 cfs	0.789 af
	Discarded=0.03 cfs	0.087 af	Primary=7.83 cfs	0.702 af
			Outflow=7.86 cfs	0.789 af
Pond 112B: Stone Trench	Peak Elev=240.01'	Storage=0.001 af	Inflow=0.23 cfs	0.018 af
	Discarded=0.01 cfs	0.009 af	Primary=0.22 cfs	0.008 af
			Outflow=0.23 cfs	0.018 af
Pond 114: Bio-Retention Area	Peak Elev=243.21'	Storage=760 cf	Inflow=1.15 cfs	0.086 af
	Discarded=0.01 cfs	0.033 af	Primary=1.14 cfs	0.054 af
			Outflow=1.15 cfs	0.086 af
Pond 116: Stone Trench	Peak Elev=242.01'	Storage=0.001 af	Inflow=0.16 cfs	0.013 af
	Discarded=0.01 cfs	0.008 af	Primary=0.15 cfs	0.005 af
			Outflow=0.16 cfs	0.013 af
Pond 118: Bio-Retention Area	Peak Elev=248.76'	Storage=2,512 cf	Inflow=3.25 cfs	0.245 af
	Discarded=0.03 cfs	0.101 af	Primary=3.16 cfs	0.144 af
			Outflow=3.19 cfs	0.245 af
Pond 122: Bio-Retention Area	Peak Elev=253.01'	Storage=2,931 cf	Inflow=2.76 cfs	0.206 af
	Discarded=0.04 cfs	0.117 af	Primary=2.40 cfs	0.090 af
			Outflow=2.44 cfs	0.206 af
Pond 124: Bio-Retention Area	Peak Elev=257.75'	Storage=2,728 cf	Inflow=2.46 cfs	0.184 af
	Discarded=0.04 cfs	0.108 af	Primary=1.96 cfs	0.076 af
			Outflow=2.00 cfs	0.184 af
Pond 126: Drywell	Peak Elev=253.67'	Storage=0.001 af	Inflow=0.08 cfs	0.007 af
	Discarded=0.00 cfs	0.004 af	Primary=0.08 cfs	0.003 af
			Outflow=0.08 cfs	0.007 af
Pond 128: Bio-Retention Area	Peak Elev=261.24'	Storage=4,101 cf	Inflow=2.63 cfs	0.197 af
	Discarded=0.05 cfs	0.158 af	Primary=0.57 cfs	0.039 af
			Outflow=0.62 cfs	0.197 af
Pond 130: Stone Trench	Peak Elev=260.02'	Storage=0.003 af	Inflow=0.32 cfs	0.025 af
	Discarded=0.01 cfs	0.014 af	Primary=0.31 cfs	0.011 af
			Outflow=0.32 cfs	0.025 af
Pond 132: Bio-Retention Area	Peak Elev=265.51'	Storage=3,327 cf	Inflow=2.32 cfs	0.175 af
	Discarded=0.04 cfs	0.129 af	Primary=0.81 cfs	0.045 af
			Outflow=0.85 cfs	0.175 af
Pond 134: Stone Trench	Peak Elev=264.02'	Storage=0.004 af	Inflow=0.41 cfs	0.032 af
	Discarded=0.01 cfs	0.018 af	Primary=0.40 cfs	0.014 af
			Outflow=0.41 cfs	0.032 af
Pond 136: Drywell	Peak Elev=263.98'	Storage=0.001 af	Inflow=0.14 cfs	0.012 af
	Discarded=0.00 cfs	0.004 af	Primary=0.14 cfs	0.007 af
			Outflow=0.14 cfs	0.012 af
Pond 138: Stone Trench	Peak Elev=266.02'	Storage=0.003 af	Inflow=0.45 cfs	0.037 af
	Discarded=0.02 cfs	0.022 af	Primary=0.43 cfs	0.015 af
			Outflow=0.45 cfs	0.037 af
Pond 140: Drywell	Peak Elev=266.23'	Storage=0.001 af	Inflow=0.15 cfs	0.012 af
	Discarded=0.00 cfs	0.006 af	Primary=0.15 cfs	0.006 af
			Outflow=0.15 cfs	0.012 af
Pond 142: Drywell	Peak Elev=263.23'	Storage=0.001 af	Inflow=0.15 cfs	0.012 af
	Discarded=0.00 cfs	0.004 af	Primary=0.15 cfs	0.008 af
			Outflow=0.15 cfs	0.012 af
Pond 144: Stone Trench	Peak Elev=258.02'	Storage=0.004 af	Inflow=0.48 cfs	0.040 af
	Discarded=0.02 cfs	0.024 af	Primary=0.46 cfs	0.016 af
			Outflow=0.48 cfs	0.040 af

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Type III 24-hr 100-Year Rainfall=8.50"

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Pond 146: Drywell

Peak Elev=262.25' Storage=0.003 af Inflow=0.17 cfs 0.014 af
Discarded=0.00 cfs 0.005 af Primary=0.17 cfs 0.009 af Outflow=0.17 cfs 0.014 af

Total Runoff Area = 137.890 ac Runoff Volume = 62.429 af Average Runoff Depth = 5.43"
95.75% Pervious = 132.028 ac 4.25% Impervious = 5.862 ac

Summary for Subcatchment 101: Subcat 101 Pr

Runoff = 326.74 cfs @ 12.69 hrs, Volume= 53.067 af, Depth= 5.38"
 Routed to Reach DP-1 : Design Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
57.145	70	Woods, Good, HSG C
43.440	77	Woods, Good, HSG D
* 0.336	98	Proposed Homes (0.52 to Bio)
* 15.899	74	>75% Grass cover, Good, HSG B (0.44 to Bio)
* 1.220	98	Existing Impervious Area
0.190	80	>75% Grass cover, Good, HSG D
0.173	98	Paved parking, HSG C
* 0.041	98	Driveway Lots 8 and 9
* 0.027	98	Driveway Lots 6 and 7
118.471	74	Weighted Average
116.674	73	98.48% Pervious Area
1.797	98	1.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.1	100	0.0200	0.08		Sheet Flow, 1A-1B
					Woods: Light underbrush n= 0.400 P2= 3.30"
28.8	3,730	0.0180	2.16		Shallow Concentrated Flow, 1B-1C
					Unpaved Kv= 16.1 fps
49.9	3,830	Total			

Summary for Subcatchment 102: Subcat 102 Pr

Runoff = 42.68 cfs @ 12.32 hrs, Volume= 4.900 af, Depth= 5.85"
 Routed to Pond 103 : Bypass U

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
4.024	70	Woods, Good, HSG C
3.807	74	>75% Grass cover, Good, HSG C
* 0.660	98	Proposed Homes
* 0.700	98	Proposed Road
* 0.692	98	Proposed Driveways
0.159	98	Paved parking, HSG A
10.042	78	Weighted Average
7.831	72	77.98% Pervious Area
2.211	98	22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	100	0.0300	0.09		Sheet Flow, 2A-2B Woods: Light underbrush n= 0.400 P2= 3.30"
3.9	539	0.0200	2.28		Shallow Concentrated Flow, 2B-2C Unpaved Kv= 16.1 fps
2.0	1,007	0.0100	8.51	26.74	Pipe Channel, 2C-2D 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
23.9	1,646	Total			

Summary for Subcatchment 109: L1 & L2

Runoff = 1.69 cfs @ 12.08 hrs, Volume= 0.129 af, Depth= 7.30"
Routed to Reach 110 : Pre-Treatment Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.138	98	Driveways
0.074	74	>75% Grass cover, Good, HSG C
0.212	90	Weighted Average
0.074	74	34.91% Pervious Area
0.138	98	65.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 111: L1 & L2

Runoff = 6.77 cfs @ 12.22 hrs, Volume= 0.660 af, Depth= 5.50"
Routed to Pond 112 : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.068	98	Front of Large Homes
* 0.109	98	Driveways
0.584	74	>75% Grass cover, Good, HSG C
0.681	70	Woods, Good, HSG C
1.442	75	Weighted Average
1.265	72	87.73% Pervious Area
0.177	98	12.27% Impervious Area

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Type III 24-hr 100-Year Rainfall=8.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0180	0.11		Sheet Flow, A
					Grass: Dense n= 0.240 P2= 3.30"
1.7	183	0.0123	1.79		Shallow Concentrated Flow, B
					Unpaved Kv= 16.1 fps
16.4	283	Total			

Summary for Subcatchment 112A: L1 & L2

Runoff = 0.23 cfs @ 12.08 hrs, Volume= 0.018 af, Depth= 7.54"
 Routed to Pond 112B : Stone Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.021	98	Driveways
0.007	74	>75% Grass cover, Good, HSG C
0.028	92	Weighted Average
0.007	74	25.00% Pervious Area
0.021	98	75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment 113: L3

Runoff = 1.15 cfs @ 12.08 hrs, Volume= 0.086 af, Depth= 7.06"
 Routed to Pond 114 : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.034	98	Front of Large Homes
* 0.054	98	Driveways
0.059	74	>75% Grass cover, Good, HSG C
0.147	88	Weighted Average
0.059	74	40.14% Pervious Area
0.088	98	59.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 115: L3

Runoff = 0.16 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 8.26"
 Routed to Pond 116 : Stone Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.019	98	Driveways
0.019	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 117: L4 & L5

Runoff = 2.59 cfs @ 12.08 hrs, Volume= 0.195 af, Depth= 7.06"
 Routed to Pond 118 : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.069	98	Front of Large Homes
* 0.126	98	Driveways
0.136	74	>75% Grass cover, Good, HSG C
0.331	88	Weighted Average
0.136	74	41.09% Pervious Area
0.195	98	58.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 119: L4 & L5

Runoff = 0.68 cfs @ 12.09 hrs, Volume= 0.050 af, Depth= 6.58"
 Routed to Reach 120 : Pre-Treatment Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.038	98	Driveways
0.054	74	>75% Grass cover, Good, HSG C
0.092	84	Weighted Average
0.054	74	58.70% Pervious Area
0.038	98	41.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 121: L6 & L7

Runoff = 2.76 cfs @ 12.08 hrs, Volume= 0.206 af, Depth= 6.94"
 Routed to Pond 122 : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.069	98	Front of Large Homes
* 0.120	98	Driveways
0.168	74	>75% Grass cover, Good, HSG C
0.357	87	Weighted Average
0.168	74	47.06% Pervious Area
0.189	98	52.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 123: L8 & L9

Runoff = 2.46 cfs @ 12.08 hrs, Volume= 0.184 af, Depth= 6.94"
 Routed to Pond 124 : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.069	98	Front of Large Homes
* 0.106	98	Driveways
0.143	74	>75% Grass cover, Good, HSG C
0.318	87	Weighted Average
0.143	74	44.97% Pervious Area
0.175	98	55.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 125: L8

Runoff = 0.08 cfs @ 12.08 hrs, Volume= 0.007 af, Depth= 8.26"
 Routed to Pond 126 : Drywell

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.010	98	Roof
0.010	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment 127: L10 & L11

Runoff = 2.63 cfs @ 12.08 hrs, Volume= 0.197 af, Depth= 6.94"
 Routed to Pond 128 : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.069	98	Front of Large Homes
* 0.117	98	Driveways
0.154	74	>75% Grass cover, Good, HSG C
0.340	87	Weighted Average
0.154	74	45.29% Pervious Area
0.186	98	54.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 129: L10 & L11

Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.025 af, Depth= 7.66"
 Routed to Pond 130 : Stone Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.031	98	Driveways
0.008	74	>75% Grass cover, Good, HSG C
0.039	93	Weighted Average
0.008	74	20.51% Pervious Area
0.031	98	79.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 131: L12 & L13

Runoff = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af, Depth= 7.06"
 Routed to Pond 132 : Bio-Retention Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.069	98	Front of Large Homes
* 0.107	98	Driveways
0.121	74	>75% Grass cover, Good, HSG C
0.297	88	Weighted Average
0.121	74	40.74% Pervious Area
0.176	98	59.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 133: L12 & L13

Runoff = 0.41 cfs @ 12.08 hrs, Volume= 0.032 af, Depth= 7.66"
 Routed to Pond 134 : Stone Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.039	98	Driveways
0.011	74	>75% Grass cover, Good, HSG C
0.050	93	Weighted Average
0.011	74	22.00% Pervious Area
0.039	98	78.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 135: L13

Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.012 af, Depth= 8.26"
 Routed to Pond 136 : Drywell

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.017	98	Roof
0.017	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment 137: L14

Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.037 af, Depth= 8.26"
 Routed to Pond 138 : Stone Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.054	98	Driveways
0.054	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 139: L14

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af, Depth= 8.26"
 Routed to Pond 140 : Drywell

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.018	98	Roof
0.018	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

Summary for Subcatchment 141: L15

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af, Depth= 8.26"
 Routed to Pond 142 : Drywell

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.018	98	Roof
0.018	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment 143: L16

Runoff = 0.48 cfs @ 12.08 hrs, Volume= 0.040 af, Depth= 8.26"
 Routed to Pond 144 : Stone Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.058	98	Roof
0.058	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment 145: L16

Runoff = 0.17 cfs @ 12.08 hrs, Volume= 0.014 af, Depth= 8.26"
 Routed to Pond 146 : Drywell

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
* 0.020	98	Roof
0.020	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Summary for Subcatchment 201: Subcat 201 Pr

Runoff = 23.33 cfs @ 12.25 hrs, Volume= 2.358 af, Depth= 5.14"
 Routed to Reach DL-2 : Design Line 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)	CN	Description
4.211	70	Woods, Good, HSG C
* 0.020	98	Proposed Homes
* 0.050	98	Proposed Driveways
1.112	74	>75% Grass cover, Good, HSG C
* 0.070	98	Roadway
0.047	98	Paved parking, HSG C
5.510	72	Weighted Average
5.323	71	96.61% Pervious Area
0.187	98	3.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	100	0.0300	0.09		Sheet Flow, 2A-2B Woods: Light underbrush n= 0.400 P2= 3.30"

Summary for Reach 107: Pond Discharge

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 5.58" for 100-Year event
 Inflow = 40.96 cfs @ 12.38 hrs, Volume= 4.669 af
 Outflow = 15.08 cfs @ 12.88 hrs, Volume= 4.665 af, Atten= 63%, Lag= 29.8 min
 Routed to Reach 108 : Stream

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.25 fps, Min. Travel Time= 80.6 min
 Avg. Velocity= 0.07 fps, Avg. Travel Time= 294.0 min

Peak Storage= 72,906 cf @ 12.88 hrs
 Average Depth at Peak Storage= 0.45' , Surface Width= 200.89'
 Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 85.73 cfs

300.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
 Length= 1,214.0' Slope= 0.0229 '/'
 Inlet Invert= 228.75', Outlet Invert= 201.00'



Summary for Reach 108: Stream

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth > 5.58" for 100-Year event
Inflow = 15.08 cfs @ 12.88 hrs, Volume= 4.665 af
Outflow = 13.47 cfs @ 13.26 hrs, Volume= 4.664 af, Atten= 11%, Lag= 22.7 min
Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.51 fps, Min. Travel Time= 22.3 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 77.0 min

Peak Storage= 18,007 cf @ 13.26 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 64.48'
Bank-Full Depth= 0.50' Flow Area= 33.3 sf, Capacity= 90.16 cfs

100.00' x 0.50' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 2,015.0' Slope= 0.0129 '/
Inlet Invert= 201.00', Outlet Invert= 175.00'



Summary for Reach 110: Pre-Treatment Swale

Inflow Area = 0.212 ac, 65.09% Impervious, Inflow Depth = 7.30" for 100-Year event
Inflow = 1.69 cfs @ 12.08 hrs, Volume= 0.129 af
Outflow = 1.56 cfs @ 12.12 hrs, Volume= 0.129 af, Atten= 8%, Lag= 2.0 min
Routed to Pond 112 : Bio-Retention Area

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.83 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 10.3 min

Peak Storage= 286 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.39' , Surface Width= 3.35'
Bank-Full Depth= 0.50' Flow Area= 1.3 sf, Capacity= 2.63 cfs

1.00' x 0.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/ Top Width= 4.00'
Length= 335.5' Slope= 0.0089 '/
Inlet Invert= 239.00', Outlet Invert= 236.00'



Summary for Reach 120: Pre-Treatment Swale

Inflow Area = 0.092 ac, 41.30% Impervious, Inflow Depth = 6.58" for 100-Year event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 0.050 af
Outflow = 0.67 cfs @ 12.10 hrs, Volume= 0.050 af, Atten= 2%, Lag= 0.9 min
Routed to Pond 118 : Bio-Retention Area

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.40 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 4.0 min

Peak Storage= 49 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 2.60'
Bank-Full Depth= 0.50' Flow Area= 1.3 sf, Capacity= 2.47 cfs

1.00' x 0.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 ' / ' Top Width= 4.00'
Length= 101.2' Slope= 0.0079 ' / '
Inlet Invert= 248.80', Outlet Invert= 248.00'



Summary for Reach DL-2: Design Line 2

Inflow Area = 5.510 ac, 3.39% Impervious, Inflow Depth = 5.14" for 100-Year event
Inflow = 23.33 cfs @ 12.25 hrs, Volume= 2.358 af
Outflow = 23.33 cfs @ 12.25 hrs, Volume= 2.358 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach DP-1: Design Point 1

Inflow Area = 132.380 ac, 4.29% Impervious, Inflow Depth = 5.35" for 100-Year event
Inflow = 338.28 cfs @ 12.69 hrs, Volume= 58.984 af
Outflow = 338.28 cfs @ 12.69 hrs, Volume= 58.984 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 103: Bypass U

0161-184-ALLS-EPHCD-INHS

Type III 24-hr 100-Year Rainfall=8.50"

Prepared by DiPrete Engineering

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Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 5.85" for 100-Year event
 Inflow = 42.68 cfs @ 12.32 hrs, Volume= 4.900 af
 Outflow = 42.68 cfs @ 12.32 hrs, Volume= 4.900 af, Atten= 0%, Lag= 0.0 min
 Primary = 11.79 cfs @ 12.32 hrs, Volume= 2.198 af
 Routed to Pond 104 : Forebay
 Secondary = 30.89 cfs @ 12.32 hrs, Volume= 2.702 af
 Routed to Pond 106 : Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 238.13' @ 12.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 3	233.65'	6.0' long Overflow Weir 2 End Contraction(s)
#2	Primary	233.00'	15.0" Round Culvert L= 17.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 233.00' / 231.50' S= 0.0852 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 4	230.69'	24.0" Round Culvert L= 88.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 230.69' / 230.25' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#4	Secondary	230.25'	24.0" Round Culvert L= 50.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 230.25' / 230.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=11.77 cfs @ 12.32 hrs HW=238.13' TW=234.16' (Dynamic Tailwater)
 ↑**2=Culvert** (Inlet Controls 11.77 cfs @ 9.59 fps)

Secondary OutFlow Max=30.85 cfs @ 12.32 hrs HW=238.13' TW=233.97' (Dynamic Tailwater)
 ↑**4=Culvert** (Controls 30.85 cfs)
 ↑**3=Culvert** (Inlet Controls 30.85 cfs @ 9.82 fps)
 ↑**1=Overflow Weir** (Passes 30.85 cfs of 156.94 cfs potential flow)

Summary for Pond 104: Forebay

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 2.63" for 100-Year event
 Inflow = 11.79 cfs @ 12.32 hrs, Volume= 2.198 af
 Outflow = 11.41 cfs @ 12.35 hrs, Volume= 2.198 af, Atten= 3%, Lag= 2.0 min
 Primary = 11.41 cfs @ 12.35 hrs, Volume= 2.198 af
 Routed to Pond 105 : Sand Filter

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Starting Elev= 233.00' Surf.Area= 1,422 sf Storage= 2,103 cf
 Peak Elev= 234.19' @ 12.39 hrs Surf.Area= 1,958 sf Storage= 4,110 cf (2,007 cf above start)

Plug-Flow detention time= 34.0 min calculated for 2.149 af (98% of inflow)
 Center-of-Mass det. time= 11.9 min (885.3 - 873.4)

Volume	Invert	Avail.Storage	Storage Description
#1	231.00'	5,857 cf	Ponding (Prismatic) Listed below (Recalc)

0161-184-ALLS-EPHCD-INHS

Type III 24-hr 100-Year Rainfall=8.50"

Prepared by DiPrete Engineering

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
231.00	710	0	0
232.00	1,037	874	874
233.00	1,422	1,230	2,103
234.00	1,863	1,643	3,746
235.00	2,360	2,112	5,857

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=11.15 cfs @ 12.35 hrs HW=234.18' TW=234.09' (Dynamic Tailwater)
 ↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 11.15 cfs @ 1.57 fps)

Summary for Pond 105: Sand Filter

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 2.63" for 100-Year event
 Inflow = 11.41 cfs @ 12.35 hrs, Volume= 2.198 af
 Outflow = 11.22 cfs @ 12.41 hrs, Volume= 2.198 af, Atten= 2%, Lag= 3.4 min
 Discarded = 0.07 cfs @ 6.98 hrs, Volume= 0.230 af
 Primary = 11.15 cfs @ 12.41 hrs, Volume= 1.968 af
 Routed to Pond 106 : Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 234.10' @ 12.40 hrs Surf.Area= 2,990 sf Storage= 6,675 cf

Plug-Flow detention time= 82.5 min calculated for 2.197 af (100% of inflow)
 Center-of-Mass det. time= 82.6 min (967.9 - 885.3)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	2,960 cf	Sand Filter & Top Soil (Prismatic) Listed below (Recalc) 8,970 cf Overall x 33.0% Voids
#2	233.00'	7,435 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		10,395 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	2,990	0	0
233.00	2,990	8,970	8,970

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
233.00	2,990	0	0
233.50	3,341	1,583	1,583
234.00	3,705	1,762	3,344
235.00	4,476	4,091	7,435

Device	Routing	Invert	Outlet Devices
#1	Discarded	230.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	233.50'	15.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.07 cfs @ 6.98 hrs HW=230.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=11.24 cfs @ 12.41 hrs HW=234.10' TW=233.99' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 11.24 cfs @ 1.25 fps)

Summary for Pond 106: Basin 1

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 5.58" for 100-Year event
 Inflow = 41.47 cfs @ 12.35 hrs, Volume= 4.669 af
 Outflow = 40.96 cfs @ 12.38 hrs, Volume= 4.669 af, Atten= 1%, Lag= 2.0 min
 Primary = 11.47 cfs @ 12.38 hrs, Volume= 2.546 af
 Routed to Reach 107 : Pond Discharge
 Secondary = 29.50 cfs @ 12.38 hrs, Volume= 2.124 af
 Routed to Reach 107 : Pond Discharge

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 233.99' @ 12.38 hrs Surf.Area= 7,281 sf Storage= 22,112 cf

Plug-Flow detention time= 94.1 min calculated for 4.669 af (100% of inflow)
 Center-of-Mass det. time= 94.3 min (923.7 - 829.4)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	29,951 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	3,939	0	0
231.00	4,692	4,316	4,316
232.00	5,501	5,097	9,412
233.00	6,366	5,934	15,346
234.00	7,289	6,828	22,173
235.00	8,267	7,778	29,951

Device	Routing	Invert	Outlet Devices
#1	Device 2	229.00'	24.0" Round Culvert L= 27.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 229.00' / 228.86' S= 0.0052 ' / ' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Primary	228.86'	24.0" Round Culvert L= 22.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.86' / 228.75' S= 0.0050 ' / ' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#3	Device 1	229.00'	2.5" Vert. Low Flow (CPv) C= 0.600 Limited to weir flow at low heads
#4	Secondary	233.00'	9.0' long x 0.5' breadth Weir

#5 Device 1 232.75' Head (feet) 0.20 0.40 0.60 0.80 1.00
 Coef. (English) 2.80 2.92 3.08 3.30 3.32
30.0" W x 24.0" H Vert. Orifice C= 0.600
 Limited to weir flow at low heads

Primary OutFlow Max=11.46 cfs @ 12.38 hrs HW=233.99' TW=229.07' (Dynamic Tailwater)

↳ **2=Culvert** (Passes 11.46 cfs of 38.41 cfs potential flow)

↳ **1=Culvert** (Passes 11.46 cfs of 37.17 cfs potential flow)

↳ **3=Low Flow (CPv)** (Orifice Controls 0.36 cfs @ 10.64 fps)

↳ **5=Orifice** (Orifice Controls 11.10 cfs @ 3.58 fps)

Secondary OutFlow Max=29.49 cfs @ 12.38 hrs HW=233.99' TW=229.07' (Dynamic Tailwater)

↳ **4=Weir** (Weir Controls 29.49 cfs @ 3.30 fps)

Summary for Pond 112: Bio-Retention Area

Inflow Area = 1.654 ac, 19.04% Impervious, Inflow Depth = 5.73" for 100-Year event
 Inflow = 7.87 cfs @ 12.20 hrs, Volume= 0.789 af
 Outflow = 7.86 cfs @ 12.21 hrs, Volume= 0.789 af, Atten= 0%, Lag= 0.7 min
 Discarded = 0.03 cfs @ 7.51 hrs, Volume= 0.087 af
 Primary = 7.83 cfs @ 12.21 hrs, Volume= 0.702 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 236.49' @ 12.21 hrs Surf.Area= 1,245 sf Storage= 2,270 cf

Plug-Flow detention time= 76.4 min calculated for 0.789 af (100% of inflow)
 Center-of-Mass det. time= 76.5 min (891.1 - 814.6)

Volume	Invert	Avail.Storage	Storage Description
#1	232.75'	1,233 cf	Bio Media and Mulch (Prismatic) Listed below (Recalc) 3,735 cf Overall x 33.0% Voids
#2	235.75'	1,886 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		3,118 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
232.75	1,245	0	0
235.75	1,245	3,735	3,735

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
235.75	1,245	0	0
236.00	1,345	324	324
236.25	1,450	349	673
237.00	1,783	1,212	1,886

Device	Routing	Invert	Outlet Devices
#1	Primary	236.20'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64
 2.65 2.65 2.66 2.66 2.68 2.70 2.74
 #2 Discarded 232.75' **1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.03 cfs @ 7.51 hrs HW=232.79' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=7.83 cfs @ 12.21 hrs HW=236.49' TW=0.00' (Dynamic Tailwater)
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 7.83 cfs @ 1.34 fps)

Summary for Pond 112B: Stone Trench

Inflow Area = 0.028 ac, 75.00% Impervious, Inflow Depth = 7.54" for 100-Year event
 Inflow = 0.23 cfs @ 12.08 hrs, Volume= 0.018 af
 Outflow = 0.23 cfs @ 12.09 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.2 min
 Discarded = 0.01 cfs @ 9.73 hrs, Volume= 0.009 af
 Primary = 0.22 cfs @ 12.09 hrs, Volume= 0.008 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 240.01' @ 12.09 hrs Surf.Area= 0.007 ac Storage= 0.001 af

Plug-Flow detention time= 31.6 min calculated for 0.018 af (100% of inflow)
 Center-of-Mass det. time= 31.6 min (799.1 - 767.5)

Volume	Invert	Avail.Storage	Storage Description
#1	239.50'	0.001 af	5.00'W x 65.00'L x 0.50'H Trench 0.004 af Overall x 33.0% Voids
#2	240.00'	0.004 af	5.00'W x 65.00'L x 0.50'H Above Trench -Impervious
		0.005 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	239.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	240.00'	50.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 9.73 hrs HW=239.52' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.22 cfs @ 12.09 hrs HW=240.01' TW=0.00' (Dynamic Tailwater)
 ↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.22 cfs @ 0.32 fps)

Summary for Pond 114: Bio-Retention Area

Inflow Area = 0.147 ac, 59.86% Impervious, Inflow Depth = 7.06" for 100-Year event
 Inflow = 1.15 cfs @ 12.08 hrs, Volume= 0.086 af
 Outflow = 1.15 cfs @ 12.09 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.3 min
 Discarded = 0.01 cfs @ 7.43 hrs, Volume= 0.033 af
 Primary = 1.14 cfs @ 12.09 hrs, Volume= 0.054 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 243.21' @ 12.09 hrs Surf.Area= 431 sf Storage= 760 cf

Plug-Flow detention time= 271.0 min calculated for 0.086 af (100% of inflow)
 Center-of-Mass det. time= 271.1 min (1,051.3 - 780.2)

Volume	Invert	Avail.Storage	Storage Description
#1	239.50'	427 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 1,293 cf Overall x 33.0% Voids
#2	242.50'	830 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		1,257 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
239.50	431	0	0
242.50	431	1,293	1,293

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
242.50	431	0	0
243.25	509	353	353
244.00	764	477	830

Device	Routing	Invert	Outlet Devices
#1	Primary	243.15'	29.7' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	239.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.01 cfs @ 7.43 hrs HW=239.55' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.14 cfs @ 12.09 hrs HW=243.21' TW=0.00' (Dynamic Tailwater)

↑**1=Broad-Crested Rectangular Weir** (Weir Controls 1.14 cfs @ 0.61 fps)

Summary for Pond 116: Stone Trench

Inflow Area = 0.019 ac, 100.00% Impervious, Inflow Depth = 8.26" for 100-Year event
 Inflow = 0.16 cfs @ 12.08 hrs, Volume= 0.013 af
 Outflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.2 min
 Discarded = 0.01 cfs @ 10.09 hrs, Volume= 0.008 af
 Primary = 0.15 cfs @ 12.09 hrs, Volume= 0.005 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 242.01' @ 12.09 hrs Surf.Area= 0.007 ac Storage= 0.001 af

Plug-Flow detention time= 31.8 min calculated for 0.013 af (100% of inflow)

Center-of-Mass det. time= 31.8 min (772.2 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	241.50'	0.001 af	5.00'W x 58.00'L x 0.50'H Trench 0.003 af Overall x 33.0% Voids
#2	242.00'	0.003 af	5.00'W x 58.00'L x 0.50'H Above Trench -Impervious
		0.004 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	241.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	242.00'	50.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 10.09 hrs HW=241.52' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.15 cfs @ 12.09 hrs HW=242.01' TW=0.00' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.15 cfs @ 0.29 fps)

Summary for Pond 118: Bio-Retention Area

Inflow Area = 0.423 ac, 55.08% Impervious, Inflow Depth = 6.95" for 100-Year event
 Inflow = 3.25 cfs @ 12.09 hrs, Volume= 0.245 af
 Outflow = 3.19 cfs @ 12.10 hrs, Volume= 0.245 af, Atten= 2%, Lag= 1.0 min
 Discarded = 0.03 cfs @ 7.78 hrs, Volume= 0.101 af
 Primary = 3.16 cfs @ 12.10 hrs, Volume= 0.144 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 248.76' @ 12.10 hrs Surf.Area= 1,362 sf Storage= 2,512 cf

Plug-Flow detention time= 289.6 min calculated for 0.245 af (100% of inflow)
 Center-of-Mass det. time= 289.6 min (1,072.6 - 783.0)

Volume	Invert	Avail.Storage	Storage Description
#1	245.00'	1,348 cf	Bio Media and Mulch (Prismatic) Listed below (Recalc) 4,086 cf Overall x 33.0% Voids
#2	248.00'	2,047 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		3,395 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
245.00	1,362	0	0
248.00	1,362	4,086	4,086

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	1,362	0	0
248.75	1,688	1,144	1,144
249.25	1,923	903	2,047

Device	Routing	Invert	Outlet Devices
#1	Primary	248.60'	20.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	245.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.03 cfs @ 7.78 hrs HW=245.04' (Free Discharge)

↳ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=3.15 cfs @ 12.10 hrs HW=248.76' TW=0.00' (Dynamic Tailwater)

↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 3.15 cfs @ 0.98 fps)

Summary for Pond 122: Bio-Retention Area

Inflow Area = 0.357 ac, 52.94% Impervious, Inflow Depth = 6.94" for 100-Year event
 Inflow = 2.76 cfs @ 12.08 hrs, Volume= 0.206 af
 Outflow = 2.44 cfs @ 12.13 hrs, Volume= 0.206 af, Atten= 12%, Lag= 2.6 min
 Discarded = 0.04 cfs @ 8.53 hrs, Volume= 0.117 af
 Primary = 2.40 cfs @ 12.13 hrs, Volume= 0.090 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 253.01' @ 12.13 hrs Surf.Area= 1,599 sf Storage= 2,931 cf

Plug-Flow detention time= 402.1 min calculated for 0.206 af (100% of inflow)
 Center-of-Mass det. time= 402.2 min (1,185.3 - 783.1)

Volume	Invert	Avail.Storage	Storage Description
#1	249.25'	1,583 cf	Bio Media and Mulch (Prismatic) Listed below (Recalc) 4,797 cf Overall x 33.0% Voids
#2	252.25'	2,376 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		3,959 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.25	1,599	0	0
252.25	1,599	4,797	4,797

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
252.25	1,599	0	0
253.00	1,957	1,334	1,334
253.50	2,214	1,043	2,376

Device	Routing	Invert	Outlet Devices
#1	Primary	252.90'	28.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64
 2.65 2.65 2.66 2.66 2.68 2.70 2.74
 #2 Discarded 249.25' **1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.04 cfs @ 8.53 hrs HW=249.29' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=2.39 cfs @ 12.13 hrs HW=253.01' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 2.39 cfs @ 0.80 fps)

Summary for Pond 124: Bio-Retention Area

Inflow Area = 0.318 ac, 55.03% Impervious, Inflow Depth = 6.94" for 100-Year event
 Inflow = 2.46 cfs @ 12.08 hrs, Volume= 0.184 af
 Outflow = 2.00 cfs @ 12.14 hrs, Volume= 0.184 af, Atten= 19%, Lag= 3.5 min
 Discarded = 0.04 cfs @ 8.62 hrs, Volume= 0.108 af
 Primary = 1.96 cfs @ 12.14 hrs, Volume= 0.076 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.75' @ 12.14 hrs Surf.Area= 1,490 sf Storage= 2,728 cf

Plug-Flow detention time= 418.2 min calculated for 0.184 af (100% of inflow)
 Center-of-Mass det. time= 418.2 min (1,201.2 - 783.1)

Volume	Invert	Avail.Storage	Storage Description
#1	254.00'	1,475 cf	Bio Media and Mulch (Prismatic) Listed below (Recalc) 4,470 cf Overall x 33.0% Voids
#2	257.00'	2,232 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		3,707 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.00	1,490	0	0
257.00	1,490	4,470	4,470

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
257.00	1,490	0	0
258.00	1,961	1,726	1,726
258.25	2,087	506	2,232

Device	Routing	Invert	Outlet Devices
#1	Primary	257.65'	25.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	254.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.04 cfs @ 8.62 hrs HW=254.04' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.95 cfs @ 12.14 hrs HW=257.75' TW=0.00' (Dynamic Tailwater)

↑**1=Broad-Crested Rectangular Weir** (Weir Controls 1.95 cfs @ 0.77 fps)

Summary for Pond 126: Drywell

Inflow Area = 0.010 ac, 100.00% Impervious, Inflow Depth = 8.26" for 100-Year event
 Inflow = 0.08 cfs @ 12.08 hrs, Volume= 0.007 af
 Outflow = 0.08 cfs @ 12.09 hrs, Volume= 0.007 af, Atten= 1%, Lag= 0.5 min
 Discarded = 0.00 cfs @ 8.52 hrs, Volume= 0.004 af
 Primary = 0.08 cfs @ 12.09 hrs, Volume= 0.003 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 253.67' @ 12.09 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= 82.8 min calculated for 0.007 af (100% of inflow)
 Center-of-Mass det. time= 82.8 min (823.3 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	251.75'	0.000 af	10.00'W x 9.00'L x 0.50'H Drywell 0.001 af Overall x 33.0% Voids
#2	252.75'	0.001 af	6.00'D x 1.00'H Outlet Pipe -Impervious
		0.001 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.75'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	253.50'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 8.52 hrs HW=251.77' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.08 cfs @ 12.09 hrs HW=253.67' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 1.40 fps)

Summary for Pond 128: Bio-Retention Area

Inflow Area = 0.340 ac, 54.71% Impervious, Inflow Depth = 6.94" for 100-Year event
 Inflow = 2.63 cfs @ 12.08 hrs, Volume= 0.197 af
 Outflow = 0.62 cfs @ 12.47 hrs, Volume= 0.197 af, Atten= 76%, Lag= 23.4 min
 Discarded = 0.05 cfs @ 9.29 hrs, Volume= 0.158 af
 Primary = 0.57 cfs @ 12.47 hrs, Volume= 0.039 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 261.24' @ 12.47 hrs Surf.Area= 2,274 sf Storage= 4,101 cf

Plug-Flow detention time= 565.0 min calculated for 0.197 af (100% of inflow)

Center-of-Mass det. time= 565.0 min (1,348.1 - 783.1)

Volume	Invert	Avail.Storage	Storage Description
#1	257.50'	2,251 cf	Bio Media and Mulch (Prismatic) Listed below (Recalc) 6,822 cf Overall x 33.0% Voids
#2	260.50'	3,286 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		5,538 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
257.50	2,274	0	0
260.50	2,274	6,822	6,822

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
260.50	2,274	0	0
261.75	2,984	3,286	3,286

Device	Routing	Invert	Outlet Devices
#1	Primary	261.20'	25.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	257.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.05 cfs @ 9.29 hrs HW=257.54' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.57 cfs @ 12.47 hrs HW=261.24' TW=0.00' (Dynamic Tailwater)

↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.57 cfs @ 0.51 fps)

Summary for Pond 130: Stone Trench

Inflow Area = 0.039 ac, 79.49% Impervious, Inflow Depth = 7.66" for 100-Year event
 Inflow = 0.32 cfs @ 12.08 hrs, Volume= 0.025 af
 Outflow = 0.32 cfs @ 12.09 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.3 min
 Discarded = 0.01 cfs @ 9.44 hrs, Volume= 0.014 af
 Primary = 0.31 cfs @ 12.09 hrs, Volume= 0.011 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 260.02' @ 12.09 hrs Surf.Area= 0.011 ac Storage= 0.003 af

Plug-Flow detention time= 50.9 min calculated for 0.025 af (100% of inflow)
 Center-of-Mass det. time= 50.9 min (814.7 - 763.9)

Volume	Invert	Avail.Storage	Storage Description
#1	259.25'	0.003 af	5.00'W x 92.00'L x 0.75'H Trench 0.008 af Overall x 33.0% Voids
#2	260.00'	0.005 af	5.00'W x 92.00'L x 0.50'H Above Trench -Impervious
		0.008 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	259.25'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	260.00'	50.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 9.44 hrs HW=259.26' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.31 cfs @ 12.09 hrs HW=260.02' TW=0.00' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.31 cfs @ 0.36 fps)

Summary for Pond 132: Bio-Retention Area

Inflow Area = 0.297 ac, 59.26% Impervious, Inflow Depth = 7.06" for 100-Year event
 Inflow = 2.32 cfs @ 12.08 hrs, Volume= 0.175 af
 Outflow = 0.85 cfs @ 12.33 hrs, Volume= 0.175 af, Atten= 63%, Lag= 14.9 min
 Discarded = 0.04 cfs @ 9.00 hrs, Volume= 0.129 af
 Primary = 0.81 cfs @ 12.33 hrs, Volume= 0.045 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 265.51' @ 12.33 hrs Surf.Area= 1,820 sf Storage= 3,327 cf

Plug-Flow detention time= 526.3 min calculated for 0.175 af (100% of inflow)
 Center-of-Mass det. time= 526.3 min (1,306.5 - 780.2)

Volume	Invert	Avail.Storage	Storage Description
#1	261.75'	1,802 cf	Bio Media and Mulch (Prismatic) Listed below (Recalc) 5,460 cf Overall x 33.0% Voids
#2	264.75'	2,681 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		4,482 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
261.75	1,820	0	0
264.75	1,820	5,460	5,460

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
264.75	1,820	0	0
266.00	2,469	2,681	2,681

Device	Routing	Invert	Outlet Devices
#1	Primary	265.45'	25.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	261.75'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.04 cfs @ 9.00 hrs HW=261.79' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.81 cfs @ 12.33 hrs HW=265.51' TW=0.00' (Dynamic Tailwater)

↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.81 cfs @ 0.58 fps)

Summary for Pond 134: Stone Trench

Inflow Area = 0.050 ac, 78.00% Impervious, Inflow Depth = 7.66" for 100-Year event
 Inflow = 0.41 cfs @ 12.08 hrs, Volume= 0.032 af
 Outflow = 0.41 cfs @ 12.09 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.3 min
 Discarded = 0.01 cfs @ 9.16 hrs, Volume= 0.018 af
 Primary = 0.40 cfs @ 12.09 hrs, Volume= 0.014 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 264.02' @ 12.09 hrs Surf.Area= 0.012 ac Storage= 0.004 af

Plug-Flow detention time= 70.1 min calculated for 0.032 af (100% of inflow)
 Center-of-Mass det. time= 70.1 min (833.9 - 763.9)

Volume	Invert	Avail.Storage	Storage Description
#1	263.00'	0.004 af	5.00'W x 103.00'L x 1.00'H Trench 0.012 af Overall x 33.0% Voids
#2	264.00'	0.006 af	5.00'W x 103.00'L x 0.50'H Above Trench -Impervious
		0.010 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	263.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	264.00'	50.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 9.16 hrs HW=263.02' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.39 cfs @ 12.09 hrs HW=264.02' TW=0.00' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 0.40 fps)

Summary for Pond 136: Drywell

Inflow Area = 0.017 ac, 100.00% Impervious, Inflow Depth = 8.26" for 100-Year event
 Inflow = 0.14 cfs @ 12.08 hrs, Volume= 0.012 af
 Outflow = 0.14 cfs @ 12.09 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.00 cfs @ 6.88 hrs, Volume= 0.004 af
 Primary = 0.14 cfs @ 12.09 hrs, Volume= 0.007 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 263.98' @ 12.09 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= 69.0 min calculated for 0.012 af (100% of inflow)
 Center-of-Mass det. time= 69.0 min (809.5 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	260.00'	0.000 af	10.00'W x 9.00'L x 0.50'H Drywell 0.001 af Overall x 33.0% Voids
#2	263.00'	0.001 af	6.00'D x 1.00'H Outlet Pipe -Impervious
		0.001 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	260.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	263.75'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 6.88 hrs HW=260.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.14 cfs @ 12.09 hrs HW=263.98' TW=0.00' (Dynamic Tailwater)
 ↑2=Orifice/Grate (Orifice Controls 0.14 cfs @ 1.62 fps)

Summary for Pond 138: Stone Trench

Inflow Area = 0.054 ac, 100.00% Impervious, Inflow Depth = 8.26" for 100-Year event
 Inflow = 0.45 cfs @ 12.08 hrs, Volume= 0.037 af
 Outflow = 0.45 cfs @ 12.09 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.02 cfs @ 9.81 hrs, Volume= 0.022 af
 Primary = 0.43 cfs @ 12.09 hrs, Volume= 0.015 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 266.02' @ 12.09 hrs Surf.Area= 0.018 ac Storage= 0.003 af

Plug-Flow detention time= 31.6 min calculated for 0.037 af (100% of inflow)
 Center-of-Mass det. time= 31.6 min (772.1 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	265.50'	0.003 af	5.00'W x 153.00'L x 0.50'H Trench 0.009 af Overall x 33.0% Voids
#2	266.00'	0.009 af	5.00'W x 153.00'L x 0.50'H Above Trench -Impervious
		0.012 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	265.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	266.00'	50.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.02 cfs @ 9.81 hrs HW=265.52' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.43 cfs @ 12.09 hrs HW=266.02' TW=0.00' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.43 cfs @ 0.41 fps)

Summary for Pond 140: Drywell

Inflow Area = 0.018 ac, 100.00% Impervious, Inflow Depth = 8.26" for 100-Year event
 Inflow = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af
 Outflow = 0.15 cfs @ 12.09 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.00 cfs @ 8.63 hrs, Volume= 0.006 af
 Primary = 0.15 cfs @ 12.09 hrs, Volume= 0.006 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 266.23' @ 12.09 hrs Surf.Area= 0.004 ac Storage= 0.001 af

Plug-Flow detention time= 38.7 min calculated for 0.012 af (100% of inflow)
 Center-of-Mass det. time= 38.7 min (779.1 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	265.50'	0.001 af	13.00'W x 13.00'L x 0.50'H Drywell 0.002 af Overall x 33.0% Voids
#2	265.75'	0.001 af	6.00'D x 2.00'H Outlet Pipe -Impervious
		0.002 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	265.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	266.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 8.63 hrs HW=265.52' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.15 cfs @ 12.09 hrs HW=266.23' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 1.64 fps)

Summary for Pond 142: Drywell

Inflow Area = 0.018 ac, 100.00% Impervious, Inflow Depth = 8.26" for 100-Year event
 Inflow = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af
 Outflow = 0.15 cfs @ 12.09 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.00 cfs @ 4.29 hrs, Volume= 0.004 af
 Primary = 0.15 cfs @ 12.09 hrs, Volume= 0.008 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 263.23' @ 12.09 hrs Surf.Area= 0.001 ac Storage= 0.001 af

Plug-Flow detention time= 129.8 min calculated for 0.012 af (100% of inflow)
 Center-of-Mass det. time= 129.9 min (870.3 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	261.00'	0.000 af	8.00'W x 8.00'L x 1.00'H Drywell 0.001 af Overall x 33.0% Voids
#2	261.75'	0.001 af	6.00'D x 2.00'H Outlet Pipe -Impervious
		0.002 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	261.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	263.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 4.29 hrs HW=261.03' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.15 cfs @ 12.09 hrs HW=263.23' TW=0.00' (Dynamic Tailwater)
 ↑2=Orifice/Grate (Orifice Controls 0.15 cfs @ 1.65 fps)

Summary for Pond 144: Stone Trench

Inflow Area = 0.058 ac, 100.00% Impervious, Inflow Depth = 8.26" for 100-Year event
 Inflow = 0.48 cfs @ 12.08 hrs, Volume= 0.040 af
 Outflow = 0.48 cfs @ 12.09 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.5 min
 Discarded = 0.02 cfs @ 9.87 hrs, Volume= 0.024 af
 Primary = 0.46 cfs @ 12.09 hrs, Volume= 0.016 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 258.02' @ 12.09 hrs Surf.Area= 0.019 ac Storage= 0.004 af

Plug-Flow detention time= 31.7 min calculated for 0.040 af (100% of inflow)
 Center-of-Mass det. time= 31.7 min (772.2 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	257.50'	0.003 af	5.00'W x 167.00'L x 0.50'H Trench 0.010 af Overall x 33.0% Voids
#2	258.00'	0.010 af	5.00'W x 167.00'L x 0.50'H Above Trench -Impervious
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	257.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	258.00'	50.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.02 cfs @ 9.87 hrs HW=257.52' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.46 cfs @ 12.09 hrs HW=258.02' TW=0.00' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.46 cfs @ 0.42 fps)

Summary for Pond 146: Drywell

Inflow Area = 0.020 ac, 100.00% Impervious, Inflow Depth = 8.26" for 100-Year event
 Inflow = 0.17 cfs @ 12.08 hrs, Volume= 0.014 af
 Outflow = 0.17 cfs @ 12.09 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.00 cfs @ 3.18 hrs, Volume= 0.005 af
 Primary = 0.17 cfs @ 12.09 hrs, Volume= 0.009 af
 Routed to Reach DP-1 : Design Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 262.25' @ 12.09 hrs Surf.Area= 0.001 ac Storage= 0.003 af

Plug-Flow detention time= 409.2 min calculated for 0.014 af (100% of inflow)
 Center-of-Mass det. time= 409.4 min (1,149.9 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	258.00'	0.001 af	7.00'W x 7.00'L x 3.00'H Drywell 0.003 af Overall x 33.0% Voids
#2	259.00'	0.003 af	6.00'D x 4.00'H Outlet Pipe -Impervious
		0.004 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	258.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	262.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 3.18 hrs HW=258.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.17 cfs @ 12.09 hrs HW=262.25' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** (Orifice Controls 0.17 cfs @ 1.70 fps)

A3.5.5 HydroCAD 100-Year Emergency Outlet Calculations

Summary for Pond 103: Bypass U

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 5.85" for 100-Year event
 Inflow = 42.68 cfs @ 12.32 hrs, Volume= 4.900 af
 Outflow = 42.68 cfs @ 12.32 hrs, Volume= 4.900 af, Atten= 0%, Lag= 0.0 min
 Primary = 11.95 cfs @ 12.32 hrs, Volume= 2.074 af
 Routed to Pond 104 : Forebay
 Secondary = 30.73 cfs @ 12.32 hrs, Volume= 2.826 af
 Routed to Pond 106 : Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 238.60' @ 12.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 3	233.65'	6.0' long Overflow Weir 2 End Contraction(s)
#2	Primary	233.00'	15.0" Round Culvert L= 17.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 233.00' / 231.50' S= 0.0852 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 4	230.69'	24.0" Round Culvert L= 88.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 230.69' / 230.25' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#4	Secondary	230.25'	24.0" Round Culvert L= 50.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 230.25' / 230.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=11.93 cfs @ 12.32 hrs HW=238.60' TW=234.52' (Dynamic Tailwater)
 ↳ **2=Culvert** (Inlet Controls 11.93 cfs @ 9.72 fps)

Secondary OutFlow Max=30.69 cfs @ 12.32 hrs HW=238.60' TW=234.48' (Dynamic Tailwater)
 ↳ **4=Culvert** (Controls 30.69 cfs)
 ↳ **3=Culvert** (Inlet Controls 30.69 cfs @ 9.77 fps)
 ↳ **1=Overflow Weir** (Passes 30.69 cfs of 175.51 cfs potential flow)

Summary for Pond 104: Forebay

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 2.48" for 100-Year event
 Inflow = 11.95 cfs @ 12.32 hrs, Volume= 2.074 af
 Outflow = 11.42 cfs @ 12.36 hrs, Volume= 2.074 af, Atten= 4%, Lag= 2.2 min
 Primary = 11.42 cfs @ 12.36 hrs, Volume= 2.074 af
 Routed to Pond 105 : Sand Filter

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Starting Elev= 233.00' Surf.Area= 1,422 sf Storage= 2,103 cf
 Peak Elev= 234.57' @ 12.41 hrs Surf.Area= 2,149 sf Storage= 4,898 cf (2,795 cf above start)

Plug-Flow detention time= 37.6 min calculated for 2.026 af (98% of inflow)
 Center-of-Mass det. time= 14.1 min (880.3 - 866.2)

0161-184-ALLS-EPHCD-INHS - Emergency

Type III 24-hr 100-Year Rainfall=8.50"

Prepared by DiPrete Engineering

Printed 8/31/2023

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Page 2

Volume	Invert	Avail.Storage	Storage Description
#1	231.00'	5,857 cf	Ponding (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
231.00	710	0	0
232.00	1,037	874	874
233.00	1,422	1,230	2,103
234.00	1,863	1,643	3,746
235.00	2,360	2,112	5,857

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=10.72 cfs @ 12.36 hrs HW=234.56' TW=234.52' (Dynamic Tailwater)
 ↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 10.72 cfs @ 1.15 fps)

Summary for Pond 105: Sand Filter

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 2.48" for 100-Year event
 Inflow = 11.42 cfs @ 12.36 hrs, Volume= 2.074 af
 Outflow = 11.31 cfs @ 12.43 hrs, Volume= 2.074 af, Atten= 1%, Lag= 4.6 min
 Discarded = 0.07 cfs @ 6.98 hrs, Volume= 0.232 af
 Primary = 11.24 cfs @ 12.43 hrs, Volume= 1.842 af
 Routed to Pond 106 : Basin 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 234.53' @ 12.40 hrs Surf.Area= 2,990 sf Storage= 8,394 cf

Plug-Flow detention time= 91.3 min calculated for 2.074 af (100% of inflow)
 Center-of-Mass det. time= 91.4 min (971.7 - 880.3)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	2,960 cf	Sand Filter & Top Soil (Prismatic) Listed below (Recalc) 8,970 cf Overall x 33.0% Voids
#2	233.00'	7,435 cf	Ponding Storage (Prismatic) Listed below (Recalc) -Impervious
		10,395 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	2,990	0	0
233.00	2,990	8,970	8,970

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
233.00	2,990	0	0
233.50	3,341	1,583	1,583
234.00	3,705	1,762	3,344
235.00	4,476	4,091	7,435

Device	Routing	Invert	Outlet Devices
#1	Discarded	230.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	233.50'	15.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.07 cfs @ 6.98 hrs HW=230.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=12.00 cfs @ 12.43 hrs HW=234.53' TW=234.50' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 12.00 cfs @ 0.78 fps)

Summary for Pond 106: Basin 1

Inflow Area = 10.042 ac, 22.02% Impervious, Inflow Depth = 5.58" for 100-Year event
 Inflow = 41.14 cfs @ 12.35 hrs, Volume= 4.667 af
 Outflow = 40.59 cfs @ 12.39 hrs, Volume= 4.239 af, Atten= 1%, Lag= 2.4 min
 Secondary = 40.59 cfs @ 12.39 hrs, Volume= 4.239 af
 Routed to Reach 107 : Pond Discharge

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 234.51' @ 12.39 hrs Surf.Area= 7,790 sf Storage= 26,037 cf

Plug-Flow detention time= 68.0 min calculated for 4.239 af (91% of inflow)
 Center-of-Mass det. time= 23.3 min (854.1 - 830.8)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	29,951 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	3,939	0	0
231.00	4,692	4,316	4,316
232.00	5,501	5,097	9,412
233.00	6,366	5,934	15,346
234.00	7,289	6,828	22,173
235.00	8,267	7,778	29,951

Device	Routing	Invert	Outlet Devices
#1	Secondary	233.50'	12.0' long x 0.5' breadth Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Secondary OutFlow Max=40.59 cfs @ 12.39 hrs HW=234.51' TW=229.05' (Dynamic Tailwater)

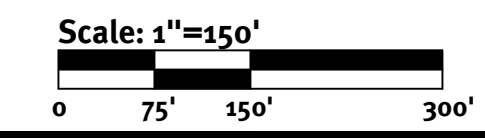
↑**1=Weir** (Weir Controls 40.59 cfs @ 3.34 fps)

Watershed Maps



LEGEND

- | | | | | | |
|-----------------|--|---------------|--|--|--|
| WOODS - B SOILS | | TO LINE | | DRAINAGE STRUCTURE/POND WITH INSIGNIFICANT STORAGE | |
| WOODS - D SOILS | | SUBCAT AREA | | REACH/SWALE | |
| IMPERVIOUS | | SOIL BOUNDARY | | DESIGN POINT | |
| GRASS - B SOILS | | SOIL TYPE | | | |
| GRASS - D SOILS | | SUBCATCHMENT | | | |
| | | DRAINAGE POND | | | |



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No.	Date	Description	By
1	07/20/21	REVISION	DP
2	07/20/21	REVISION	DP
3	07/20/21	REVISION	DP
4	07/20/21	REVISION	DP

Design By: R.B.S.

Pre Watershed Map
Fieldstone Farms
 Assessor's Block 164, Lot 9
 South Kingstown, Rhode Island
 Prepared For
Old North Land Investments LLC
 75 Lambert Lind Highway
 Warwick, Rhode Island 02886
 DE Job No: 0165-184 Copyright 2022 by DiPrete Engineering Associates, Inc.

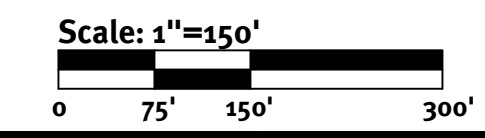
SHEET **1** OF 16



SITE
 AP 16 BLOCK 4 LOT 9
 N/F
 OLD NORTH LAND INVESTMENTS, LLC
 AREA:
 (118.60± ACRES)
 SUITABLE AREA:
 (61.83± ACRES)
 ZONE R40

LEGEND

- | | | | | | |
|-----------------|--|---------------|--|--|--|
| WOODS - B SOILS | | TO LINE | | DRAINAGE STRUCTURE/POND WITH INSIGNIFICANT STORAGE | |
| WOODS - D SOILS | | SUBCAT AREA | | REACH/SWALE | |
| IMPERVIOUS | | SOIL BOUNDARY | | DESIGN POINT | |
| GRASS - B SOILS | | SOIL TYPE | | | |
| GRASS - D SOILS | | SUBCATCHMENT | | | |
| | | DRAINAGE POND | | | |



No.	Date	Description	By	Design By
1	07/27/2022	REVISION Response to Comments	R.S.	R.S.
2	07/27/2022	REVISION Re-Submission	R.S.	R.S.
3	07/27/2022	REVISION Re-Submission	R.S.	R.S.
4	07/27/2022	REVISION Re-Submission	R.S.	R.S.
5	07/27/2022	REVISION Re-Submission	R.S.	R.S.
6	07/27/2022	REVISION Re-Submission	R.S.	R.S.
7	07/27/2022	REVISION Re-Submission	R.S.	R.S.
8	07/27/2022	REVISION Re-Submission	R.S.	R.S.
9	07/27/2022	REVISION Re-Submission	R.S.	R.S.
10	07/27/2022	REVISION Re-Submission	R.S.	R.S.